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Citation for published version (APA):
Stys, D. J., Fijneman, H. J., & Rutten, H. S. (1992). *Uncontrolled displacements between prestressed-concrete floor-slabs and supporting steel skeleton under construction*. (TU Eindhoven. Fac. Bouwkunde, Vakgr. Konstruktie; Vol. TUE-BKO-9211). Technische Universiteit Eindhoven.

Document status and date:
Published: 01/01/1992

Document Version:
Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
• The final author version and the galley proof are versions of the publication after peer review.
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Uncontrolled displacements between prestressed-concrete floor-slabs and supporting steel skeleton under construction

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April 1992

TUE/BKO/92.11

CONCENTS

1. Introduction

1.1. Description of the problem

The main goal of experimental and theoretical considerations provided in this contribution has been to find the reason for displacements of prestressed-concrete floor slabs against steel supporting girders. Phenomenon of that kind was observed in August 1991 during the assembling phase of Nieuwbouw Laboratory DKS, DSM - Geleen. After putting floor slabs over ground-floor, next day a shift of slabs was observed.
Slabs over a whole section of the construction moved on up to 0,08 m due to the lack of reinforced concrete circumferential ring clamping the edges of the slabs and due to the lack of connections among slabs also.
It should be noticed that the framing of slabs has been performed in accordance with technical recommendations. Heavy traveling crane has been used for that purpose. The details of the construction are given in photographs in Appendix 1.
The efforts, connected with the explanation of possible reasons for slab displacement have been concentrated on three interrelated problems:

- experimental analysis of the kinematic conditions at the supports of prestressed concrete slabs,
- measurement of vibrations coming from different sources located in the vicinity of construction,
- numerical analysis of the structure with special interest paid to data from experiments.

1.2. Global characteristics of the structure

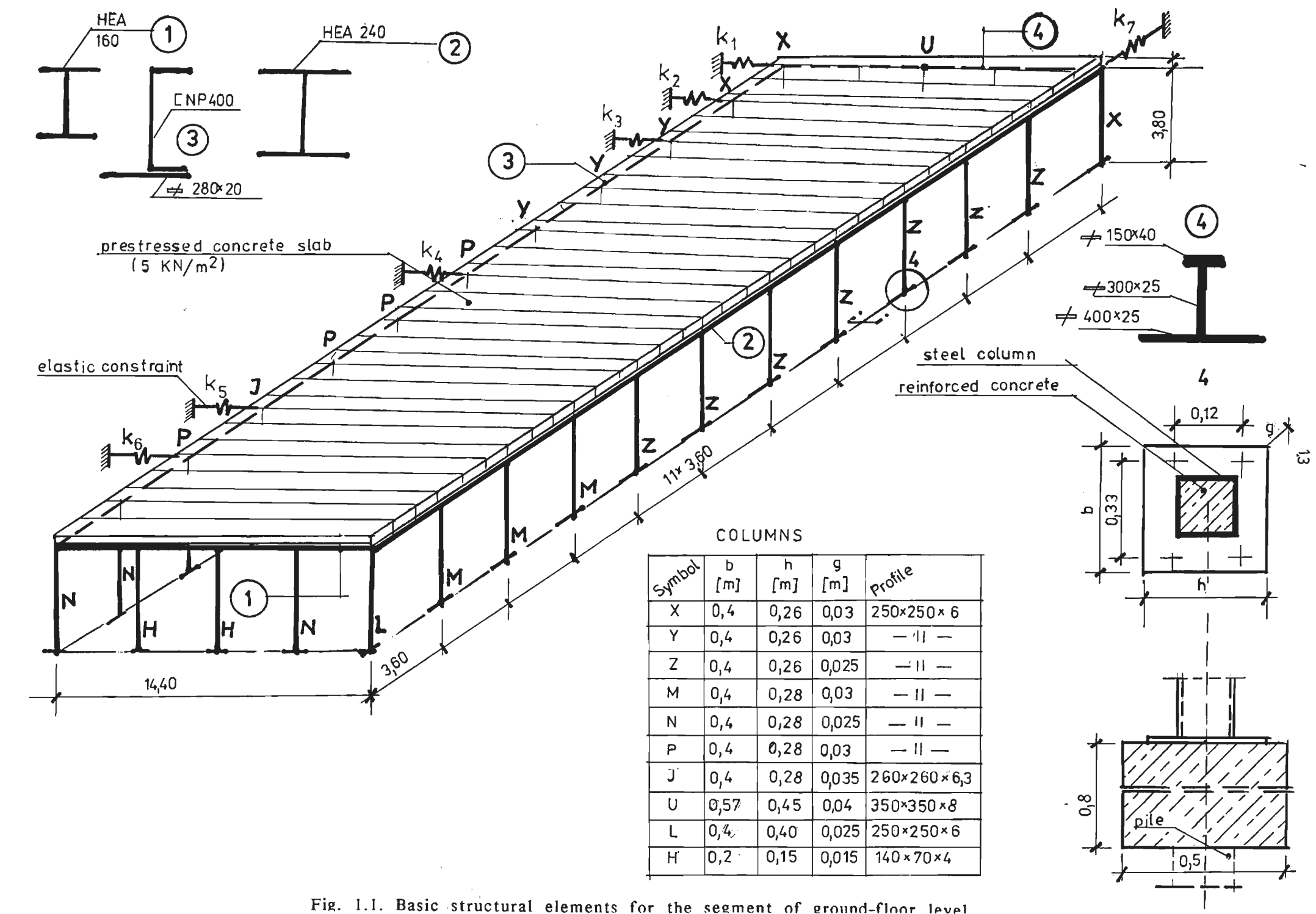
The structure of the building is complex, with two and three storeys segments covered with roofs supported by steel and wooden girders. Only one segment of the whole building has been submitted under detailed analysis. It is a part, where the slabs displacement has been the most pronounced.
The slab-skeleton structure consists of steel columns and girders supporting stiff prestressed concrete floor slabs. It has been assumed in statical calculations, that lateral forces from the wind loading are carried by the wind-bearings in the walls of the building.

In the exploitation phase the structure acts as a spatial truss-frame system with stiff floor membranes. The statical schemes of beams and columns coming from that assumption imply the presence of flexible or hinged connections in columns - foundation and columns - beams joints. It is important for the global analysis of the construction, that columns are supposed to carry only vertical forces and not the bending moments. Columns are attached to a continuous foundation reinforced by ground piles. The part of the ground-floor construction is shown in Fig. 1.1.

1.3. Loadings

In the assembling phase, when the uncontrolled displacements have taken place, the main loading acting on a structure was dead load. For its character is purely static and deterministic, it could not be the reason for large horizontal displacements of floor slabs. As the phenomena entailing displacements of a structure, shrinkage and creep for concrete and strains due to thermal expansion are sometimes reported. Shrinkage influence is important, when dealing with a fresh concrete up to 7 days after casting, and may be certainly ignored for prestressed concrete elements older than 28 days, what has been the case.

The creep of concrete cannot be considered the cause for slabs movement also. For long term loading, the deflections depend on creep coefficient, what can be the reason for supports' rotation. Since phenomenon of slabs displacement happened during several hours, the creep should be disregarded as an eventual factor developing the shift of slabs. Finally, the strains due to thermal expansion ought to be considered in more detail. Let us assume difference of temperatures $\Delta t = 60$ deg, what gives for coefficient of concrete's thermal expansion $\alpha = 10^{-5}$, the value of slab elongation $\Delta L = 0{,}0086$ m. Taking into account the average stiffness of column ($K = 1{,}086.10^6$ N/m) against lateral displacement, maximal horizontal force induced at the support is $F_1 = 0{,}0043.1{,}086.10^6 = 4{,}67$ kN. To make possible the relative displacement of slab at the support, the friction force should be less that force F_1. Since vertical reaction coming from one slab equals $R = 0{,}5.14{,}4.1{,}2.5{,}0 = 43{,}2$ kN, the friction coefficient should be smaller than $f = 4{,}67/43{,}2 = 0{,}11$. It is far from realistic not to mention high flexibility of the columns themselves.



COLUMNS

Symbol	b [m]	h [m]	g [m]	Profile
X	0,4	0,26	0,03	250×250×6
Y	0,4	0,26	0,03	— II —
Z	0,4	0,26	0,025	— II —
M	0,4	0,28	0,03	— II —
N	0,4	0,28	0,025	— II —
P	0,4	0,28	0,03	— II —
J	0,4	0,28	0,035	260×260×6,3
U	0,57	0,45	0,04	350×350×8
L	0,4	0,40	0,025	250×250×6
H	0,2	0,15	0,015	140×70×4

Fig. 1.1. Basic structural elements for the segment of ground-floor level

Still, even if it would have happened, the total elongation is very small (0.008 m) in comparison with maximal slab displacement (0.08 m).
As an eventual source for unpredictable loadings, the dynamic phenomena have been assumed. They are often responsible for uncontrolled movement of structures. Dynamic loadings are mainly connected with three factors:
- wind,
- ground vibrations generated by road traffic,
- vibrations generated by mechanical devices located in the vicinity of a structure (crane, compressor, etc.).

When dealing with dynamic analysis it is important to evaluate correctly the flexibility of a construction.
In this case, the differences between the exploitation and assembling stages are very distinct. Stability of the building during exploitation comes from the overall spatial behaviour of structural members. In the period of floor-panels installing we have to consider the big masses system (the mass of one slab is 8600 kg), supported by relatively feeble beams and columns. In reality, columns are supposed to be partially clamped in the foundation, however in statical calculations they are treated as the members with 'pinned' joints.
In connection with the stiffness of 'column-to-base' joints, substantial differences in the values of neutral frequences of eigenvibrations may arise. Some additional stiffness has been provided by 'framing bracings' fastening diagonally columns end supports along the span of slabs. They have been placed each fourth column. Since they had not been stretched (information from contractor), they acted as a precaution factor only.
Another fact of great importance is the absence of joints among concrete slabs. The slots had not been filled up with concrete and slabs were able to move against each other. It creates a different situation in comparison with monolithic floor membrane after filling up the connection.

1.3.1. Wind loading

Basically, no civil engineering structure is safe from wind loadings effects. Of critical importance are the non stationary characteristics of natural wind and the dynamic properties of the structure it acts upon. These turbulances are characterized by sudden gusts superimposed on a mean wind velocity. Most structures are relatively stiff, so that their motions correspond directly to the wind velocity fluctuations and hence a knowledge of the maximum gust speed is a sufficient basis for design. The corresponding pressure or drag force is than located as a quasi-static loading. Evidently there are many forms of structure, particularly those that are tall or slender, that respond dynamically to the wind. There are several different phenomena, giving rise to dynamic response of structure in wind. Those include buffeting, vertex shedding, galloping and flutter. Due to geometrical characteristics of the building under consideration only the quasi-static loading should be considered as the wind loading factor. Notwithstanding there had been no informations about strong wind in local weather reports, the eventual pressure of wind velocity has been evaluated. The wind profile can be described by the following law:

$$\overline{U}(Z,t) = \overline{U}_z + U(Z,t) \tag{1.1}$$

$$\overline{U}_z = \overline{U}_{10}(Z/10)^{\alpha} \tag{1.2}$$

where: Z is the height above ground level,
$\overline{U}_{10}$ is reference wind speed and
α is a roughness coefficient.

Reference wind speed is generally defined for a 10-minute-mean value. Depending on the geographical location of the measuring site, $\overline{U}_{10}$ lies usually between 24 and 34 m/s. Roughness coefficient α = 0,28 for villages and towns [7]. Thus, we obtain for $\overline{U}_{10}$ = 24,0 $\frac{m}{S}$ and Z = 4,0 m the value of $\overline{U}_Z$ = 18,6 m/s. From the mean wind speed, the wind pressure is:

$$p = 0{,}5g\ \overline{U}_Z^2 \tag{1.3}$$

for g = 1,2 kg/m^3 (air density), what yields p = 0,21 kN/m^2.

The fraction of wind speed due to turbulence is expressed as $U(Z,t)$. See Fig. 1.2.

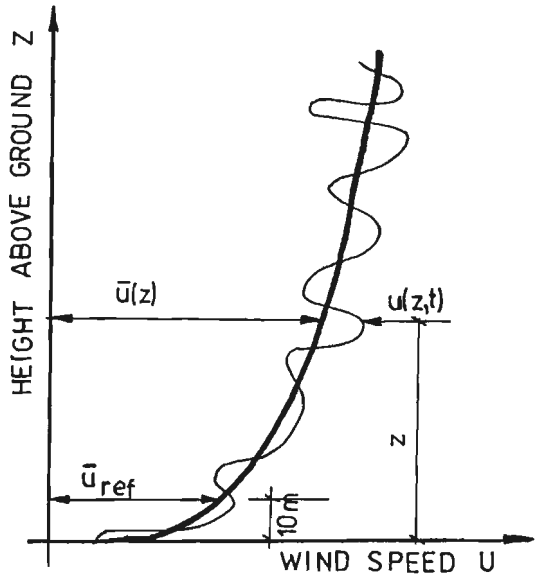


Fig. 1.2. Wind profile with superimposed turbulence.

The gust fraction $U(Z,t)$ and thus the gust speed (total speed) $\overline{U}(Z,t)$ are usually defined for the 5-second-mean value of measurements. The stochastic part of the wind speed $U(Z,t)$, requires the use of statistical methods for the calculation of the dynamic forces on the structure. For it could not have been performed (lack of data) the factor 1,8 increasing the wind pressure was assumed [9].

1.3.2. Ground vibrations entailed by external loadings

Motion of mechanic waves in elastic media

In elastic halfspace, the waves which carry the big part of the energy of vibration are Rayleigh waves (R-waves). Their motion is confined to a zone near the boundary of the half-space, that means the contact layer between soil and air.

In the case of real ground loaded by the wave front generated by a circular footing undergoing vertical oscillations, the energy coupled into the ground by a footing is transmitted away by an accelaration of shear (S), compression (C) and R-waves.

The problem is schematically outlined in Fig. 1.3 [5].

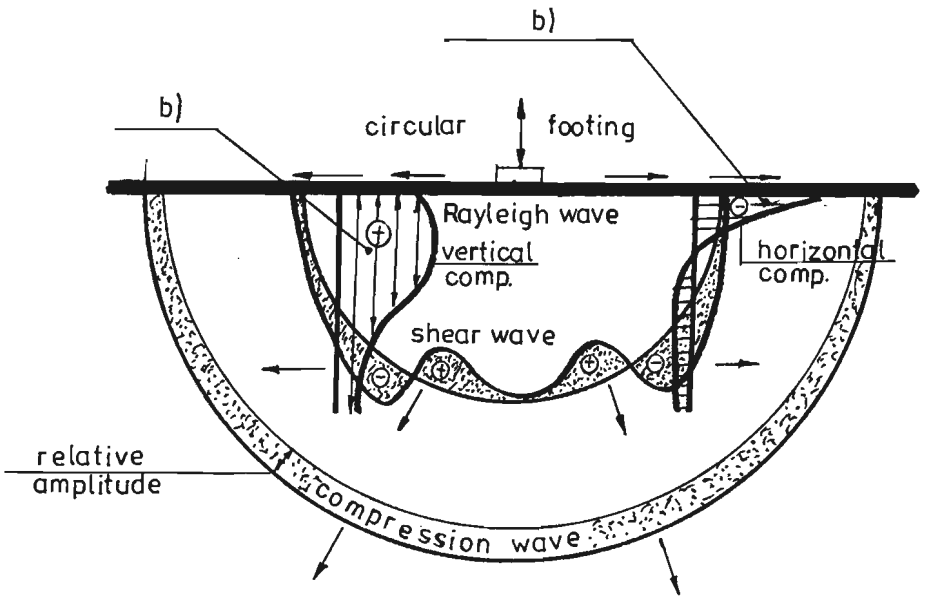


Fig. 1.3a. Distribution of displacement waves from a cirular footing on a homogeneous, isotropic, elastic half-space,

b. Distribution of the vertical and horizontal component of the waves.

The distance from the source of waves to each wave front is shown in proportion to the velocity of each type of wave (Poisson ratio ν = 0,25). The S and C-type waves propagate radially along a cylindrical wave front. The energy density in each wave decreases with distance r from the source of vibration. This decrease in displacement amplitude is so-called geometrical damping. Geometrical damping for R-waves is of the order $r^{-0,5}$. For the waves C and S-type amplitude decreases in proportion to the ratio r^{-1} except along the surface of the half-space, where the amplitude decreases as r^{-2}. The particle motion associated with the C-wave is a push-pull motion parallel to the direction of the wave front. For the S-wave type it is a transverse displacement normal to the direction of the wave front. The R-wave vector is made up of two components, horizontal and vertical, which vary in time and with depth. For only the surface layer is of our concern we are dealing here with changes due to time variation. The wave system existing in elastic half-space has three salient features corresponding to the arrival of C-wave, S-wave and R-wave. The horizontal and vertical components of waves are shown separately in Fig. 1.4.

By combining the horizontal and vertical components of motion (starting at point 1), the locus of surface-particle motion for the R-wave can be visualized as in Fig. 1.4. The time gap among the peaks for particular waves is due to different velocities of waves front. Comparing the horizontal and vertical components of R-wave amplitude one may figure the equipartition of total energy between them. The vertical component vibrates always in phase, whereas the horizontal component has a phase reversal at about 0,2 λ (λ = wave length).

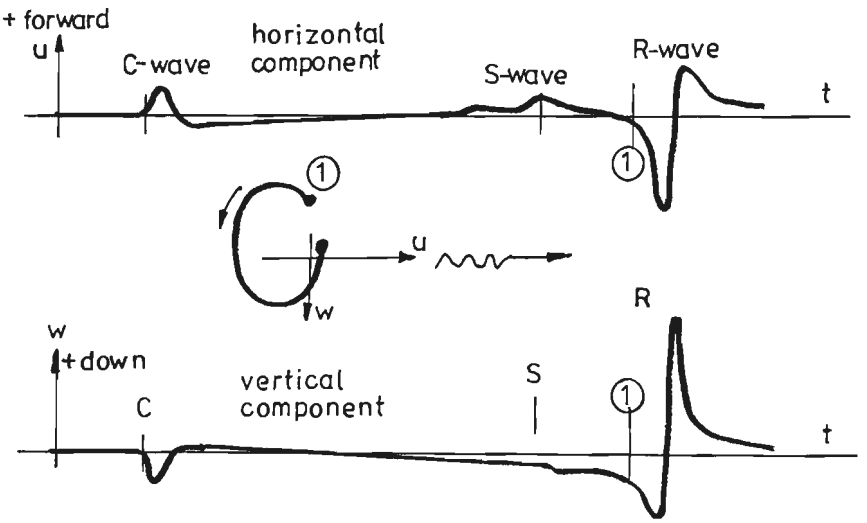


Fig. 1.4 Wave system from surface point source in ideal medium.

It is evident, from the Fig. 1.4, that R-wave is the most significant disturbance along the surface. The distribution of total input energy among three elastic waves, delivered by vertically oscillating circular energy source, determined for isotropic, elastic half-space [5] is as follows:

- R-wave 67% of total energy,
- S-wave 26% of total energy,
- C-wave 7% of total energy.

It comes strictly from the above considerations, that Rayleigh wave is of primary concern for constructions near the surface of the ground, however, one should keep in mind the deviations which account for the differences between the ideal model and real earth (layering, inhomogeneities, multishock input sources).

Because soil is not perfectly elastic, there is another consideration which influences the attenuation of R-waves. In real earth materials, energy is lost by "material damping". The evidence of this phenomenon is demonstrated by the fact, that amplitude attenuation measured in the field is greater than would be predicted by geometric damping alone. The example of attenuation curve for sand loaded by rotating-mass vibrator is shown in Fig. 1.5.

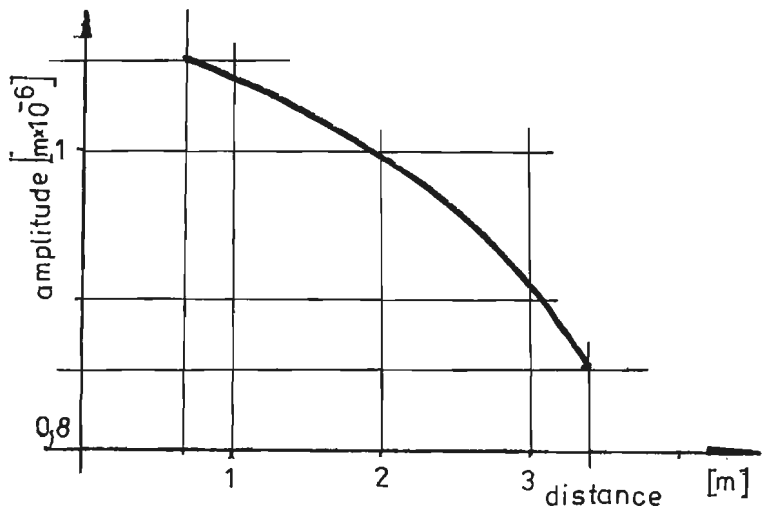


Fig. 1.5 Attenuation of surface wave with distance from source of steady-state excitation [3].

To avoid cambersome considerations concerning the mechanisms of the dissipation of vibration energy, it is recommended to perform measurements in the vicinity of a structure.

Ground vibrations induced by traffic

Heavy vehicles and trucks passing over an irregular road surface induce interacting dynamic force in the tyres and suspension. The ensuing dynamic load generates surface waves in the same manner as impulsive load, which were described in the previous section. The differences are, that the load is in motion and is an irregular function of time. The numerical analysis of that problem [8] showed that an irregular surface gives rise to significant vibration at points close to the road. Vibrations generated by traffic have been measured experimentally by many authors. Some of the results are reported in Table 1 [5,6].

Table 1. Vibration data of road traffic origin [5,6]

No.	Details	observed displacements		velocity	acceleration
		Amplitude [m]	Frequency cycles/sec	m/s	(g)
1.	Vibrations from London; traffic measured inside a building	$3{,}55.10^{-6}$	25	$5{,}59.10^{-7}$	0,009
2.	Traffic measurements in Queens Street, London	$7{,}87.10^{-6}$	14	$6{,}86.10^{-7}$	0,0062
3.	London	$9{,}14.10^{-6}$	10	$5{,}9.10^{-7}$	0,003
4.	Measurements of floor vibrations from subway New York	$1{,}98.10^{-5}$	15-20	$2{,}16.10^{-6}$	0,024

The above observations indicate, that there should be no significant vibration resulting from heavy lorries traveling over roads in reasonable condition.

The response of buildings to ground vibration depends on the distance from the source. Buildings which are far from the source of disturbance - more than 65 m - may be considered insensitive for soil vibrations coming from road traffic [8]. Experimental data for traffic induced vibrations are presented thereafter.

Miscellaneous sources of ground vibration

Many activities in construction work lead to vibrations in the neighbourhood of the construction site or even to far-field vibrations. The following construction activities and machinery are associated with possible vibrations:

- crane (installation of floor-slabs),
- compressors,
- vehicles on construction sites,
- vibrating compaction.

In the case under consideration, only the crane may be accounted for as a possible source of vibrations.

Construction work usually initiated very complex vibrations. While deterministic vibration can be described by mathematical expression and therefore predicted, thus is practically impossible with regard to random vibrations. Machines and tools used for construction work generate vibrations, which propagate through the soil, foundation and buildings in the form of elastic waves. Generally, during the transmission of waves from the ground to the building the particle velocity is lower in the foundation of the building than in the ground. Amplification of vibration may occur higher up in the structure mainly due to resonance effects. With regard to these information, still the best method of dealing with machine induced vibrations is to performe the direct measurement in the real-scale conditions. The detail description of the crane induced vibrations is given elsewhere.

1.4. Modelling of structure

The modelling of the structure, loading conditions and dynamic analysis of accelerations were performed numerically. Some preliminary assumptions concerning the eigenvalue problem were drawn on the basis of fundamental calculation for one and two-mass systems.

The selection of proper statical scheme is of primary importance for numerical analysis. At the very beginning, problem of interelements joints should be settled. A few cases have been taken into consideration:

A. 'Column-to-beam' connection.

Joints among steel elements are through the frontal panels and press bolts what offers some degree of 'fixity'. The two extreme cases, shown in Fig. 1.6, were assumed in numerical calculation.

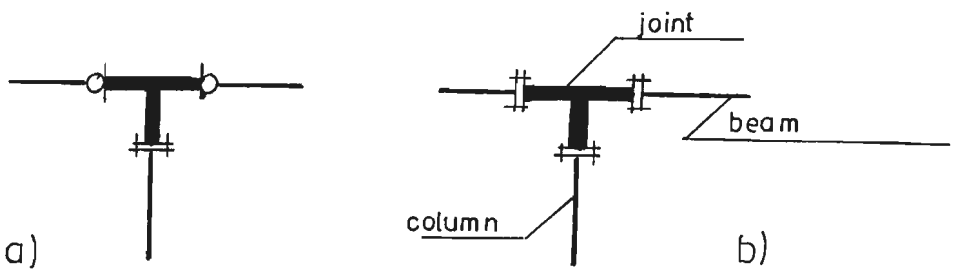


Fig. 1.6. 'Column-to-beam' connections: a) 'pinned', b) 'fixed'.

B. Connection between prestressed concrete slabs and steel beams.
To model the real conditions on that support is not an easy way even in numerical calculation. In contact, interelement layers of three materials (concrete, steel, rubber) the adhesive forces are basicly unknown. The lateral reaction at the support of concrete slab is due to friction forces only. Above certain limiting value (friction force T) the lateral reaction is kept constant but movement of the slab commences. Keeping in mind the unreliability of data concerning structure and loadings in the moment of the event, one should balance the efforts connected with application of calculation method. The sophisticated finite element programmes like for instance - DIANA or STRUDL, are very time consuming procedures and require also much time for data preparation. Usually, they are the only method capable to go through the detailed structural analysis of complex engineering problems. For multidegrees dynamic analysis as in the case under consideration, STRUDL programm is satisfactory. Following STRUDL's recommendations, we must accept some limitations provided by them. In 'slab-to-beam' joint we may keep or release lateral force at the support, as well as introduce spring constraint (linear or non-linear). It is shown in Fig. 1.7.

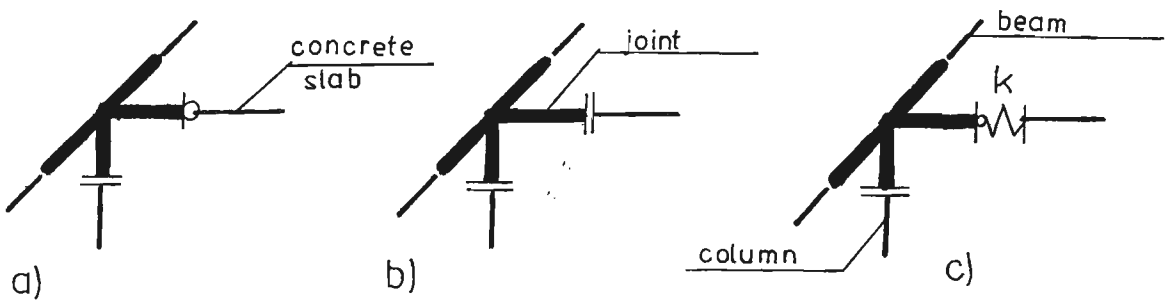


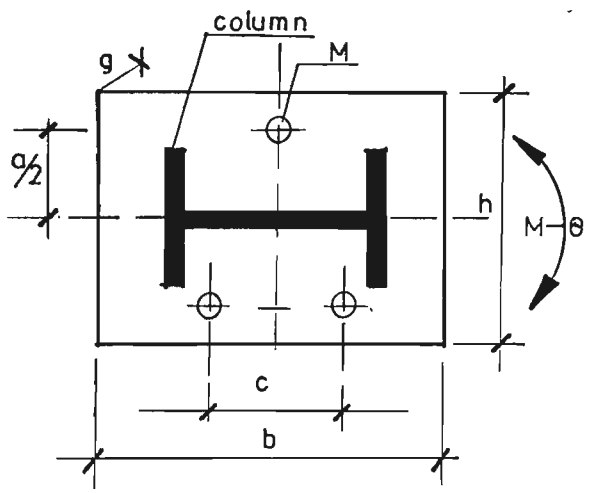
Fig. 1.7. Slab-to-beam connection.

The spring constraint is far from being realistic in our case. In numerical calculation both (b) and (c) cases were analysed.

C. 'Column-to-basement' connection.

The detailes of column-to-basement connection are shown in Fig. 1.1. It may be concluded that joints are partially fixed. In addition, narrow continuous foundation perpendicular to the direction of lateral forces, takes also part in diminishing of the global stiffness of the skeleton. Basic characteristic for column-to-basement connection is moment-rotation diagram (M-θ curve). For particular joints, M-θ curves are available only by experiments. One may find some appropriate values by comparing experimental results reported in literature. Some of them are given in Fig. 1.8.

The coefficients of flexibility are calculated for the initial stiffness of the connections [2,4].



No.	BASEMENT b×h×g [m]	M [mm]	a [m]	c [m]	COLUMN PROFILE	k [N m / rad ×10⁶]
1	0,5×0,3×0,03	20	0,14	0	I 460	8,40
2	0,5×0,3×0,016	20	0,14	0	I 460	7,00
3	0,5×0,4×0,012	20	0,18	0	I 310	4,00
4	0,5×0,4×0,012	20	0,14	0	I 310	2,00
5	0,5×0,3×0,02	20	0,15	0	I 400	22,20
6	0,5×0,4×0,03	24	0,22	0,30	I 410	1000-5000

Fig. 1.8 Examples of 'column-to-base' connections with the related coefficients of flexcibility [2,4].

2. Basic eigenvalue problem

The most important dynamic characteristic of construction, connected with stiffness and mass allocation is the period of neutral vibration T. Existing dynamic loading, having frequencies close to the neutral frequency can entail resonance. As a consequence of this fact the displacements and accelerations may attain values, which far exceed the limit of tolerance for a particular type of construction. For the evaluation of detrimental factors acting as a source of vibrations one should know at least approximate value of neutral frequency of an object [1]. Some simple calculations have been performed for one and two-mass systems according to the schemes given in Fig. 2.1.

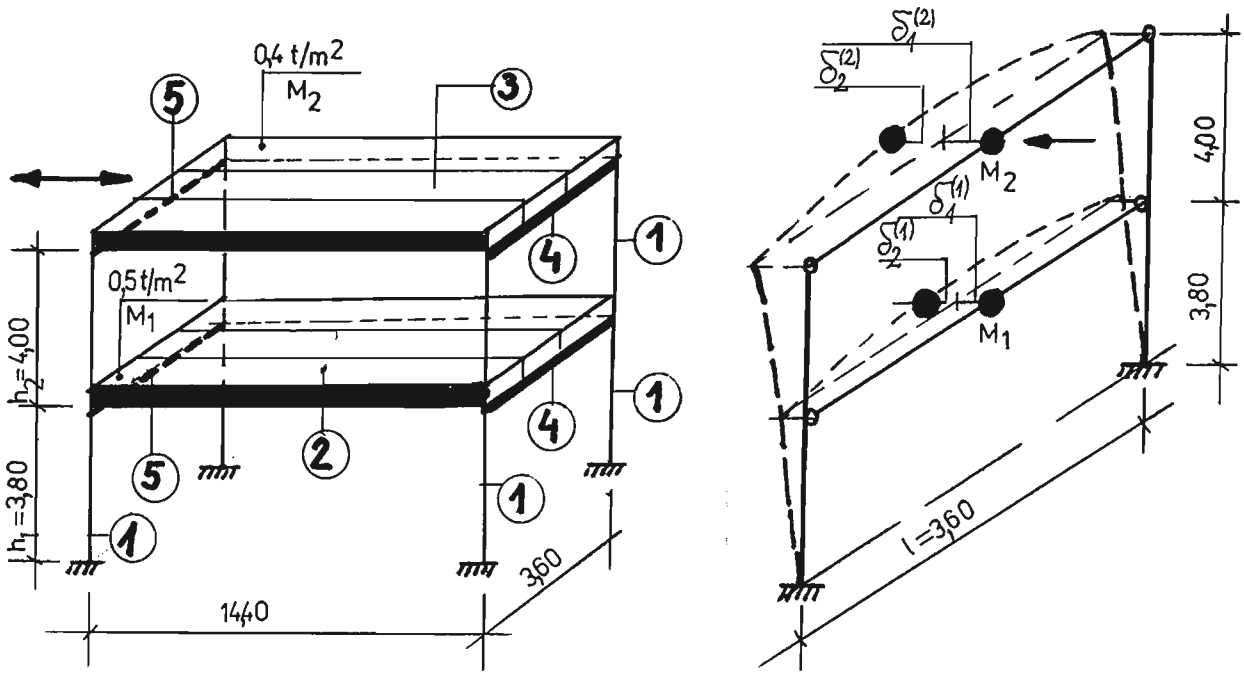


Fig. 2.1. Dynamic scheme for one and two-mass system.

The materials and geometrical characteristics of elements from Fig. 2.1 are given in Table 2.1. (see next page).

Table 2.1. Materials and geometrical characteristics of elements.

Number of element	Material	Young modulus [N/m^2]	Moment of inertia J [m^4]	Type of element
1	steel-concrete	$3{,}0.10^{10}$	$6{,}744.10^{-4}$	column
2	prestressed-concrete			floor slab (500 kg/m^2)
3	- " -			floor slab (400 kg/m^2)
4	steel	$21{,}0.10^{10}$	$0{,}2769.10^{-4}$	beam
5	steel	$21{,}0.10^{10}$	$0{,}5613.10^{-4}$	beam

Equilibrium equations for mass system are as follows [8,9]:

$$M\ddot{y}_1 + K_1 y - K_2 (y_2 - y_1) = 0 \tag{2.1}$$

$$M_2\ddot{y} + K_2 (y_2 - y_1) = 0 \tag{2.2}$$

and

$$(\omega)^2 - \left(\frac{K_1 + K_2}{M_1} + \frac{K_2}{M_2}\right)\omega^2 + \frac{K_2 K_1}{M_1 M_2} = 0 \tag{2.3}$$

where

$$K_1 = K_{\delta_1}^{(1)} + K_{\delta_2}^{(1)} \tag{2.4}$$

$$K_2 = K_{\delta_1}^{(2)} + K_{\delta_2}^{(2)} \tag{2.5}$$

$$K_{\delta_1}^{(1)} = \frac{12\ E_c.\ I_1}{h_1^{\,3}} \tag{2.6}$$

$$K_{\delta_2}^{(1)} = K_{\delta_2}^{(2)} = \frac{48E_s\,(I_4 + I_5)}{\ell^3} \tag{2.7}$$

$$K_{\delta_1}^{(2)} = \frac{12\,E_c\,I_1}{h_2^3} \tag{2.8}$$

After substituting the real values and solving equation (2.3) one gets the circular frequencies ω_1 and ω_2:

$$\omega_1 = 19{,}62\ \frac{rad}{s} \rightarrow f_1 = 3{,}12\ Hz \rightarrow T_1 = 0{,}32\ s$$

$$\omega_2 = 48{,}84\ \frac{rad}{s} \rightarrow f_2 = 7{,}77\ Hz \rightarrow T_2 = 0{,}13\ s$$

We may not include spring constant K_2 (beams' spring constant) and then we have:

$$\omega_1 = 8{,}55\ \frac{rad}{s} \rightarrow f_1 = 1{,}36\ Hz \rightarrow T_1 = 0{,}73\ s$$

$$\omega_2 = 20{,}66\ \frac{rad}{s} \rightarrow f_2 = 3{,}29\ Hz \rightarrow T_2 = 0{,}30\ s$$

Cutting out a segment of construction as in a structure geometry shown in Fig. 2.1, we overestimate the stiffness of the construction. Therefore, it is reasonable to assume also the lower limitation, when the number of columns is twice reduced and only the columns' stiffness is taken under consideration:

$$K_1 = \frac{6\,E_c\,I_1}{h_1^3} \tag{2.9}$$

$$K_2 = \frac{6\,E_c\,I_1}{h_2^3} \tag{2.10}$$

$$\omega_1 = 8{,}55\ \frac{rad}{s} \rightarrow 1{,}36\ Hz \rightarrow T_1 = 0{,}73\ s$$

$$\omega_2 = 14{,}61\ \frac{rad}{s} \rightarrow 2{,}32\ Hz \rightarrow T_2 = 0{,}43\ s$$

As a further step we may account for the situation, when only a part of slabs on the upper floor is assembled. Thus, we reduce the mass M_2 by factor 0,5:

$$\omega_1 = 7{,}376 \frac{rad}{s} \rightarrow 1{,}17 \text{ Hz} \rightarrow T_1 = 0{,}85 \text{ s}$$

$$\omega_2 = 16{,}94 \frac{rad}{s} \rightarrow 2{,}70 \text{ Hz} \rightarrow T_2 = 0{,}37 \text{ s}$$

Finally, we attain the simplest scheme, where there is no mass at all on the second floor. Basic solution reduces to the fundamental one-mass system. Having assumed the spring constants as for four-column configuration (including beams stiffness) equation (2.3) yields:

$$\omega = 29{,}48 \frac{rad}{s} \rightarrow f = 4{,}69 \text{ Hz} \rightarrow T = 0{,}21 \text{ s}$$

and without beams' stiffness:

$$\omega = 13{,}06 \frac{rad}{s} \rightarrow f = 2{,}08 \text{ Hz} \rightarrow T = 0{,}48 \text{ s}$$

Reducing the number of columns twice we obtain the lowest frequency:

$$\omega = 9{,}23 \frac{rad}{s} \rightarrow f = 1{,}47 \text{ Hz} \rightarrow T = 0{,}68 \text{ s}$$

All these basic calculations reveal, that the neutral periods of mass system vary from $T_1 = 0{,}32$ s to $T_1 = 0{,}85$ s (for mode I) and from $T_2 = 0{,}13$ s to $T_2 = 0{,}43$ s (for mode II).
One-mass system has neutral period of vibrations in the range 0,21 s - 0,68 s. It seems, that neutral frequencies are not strongly dependent on mass allocation, but change more according to the stiffness of elastic springs assumed in the model. Therefore, it is important to reflect in numerical calculations the real structure's configuration, which was subjected to dynamic loadings.
An inportant contribution to the above results, are apparent discrepancies between two assembling phases. At the beginning, there are no connections between concrete slabs, which can behave as independent elements.
All calculations of eigenvalue problem presented so far, pertain to this particular situation.

After the interelement slots are filled up with concrete, the whole floor acts as a stiff membrane. The dynamic scheme is basicly similar but elastic constants change. Dynamic characteristics for this new configuration are as follows:

- total mass of the system: $\sum M = 2.851.10^5$ Kg
- stiffness of columns: $K_1 = 28.(3EI)(h)^{-3} = 3.04.10^7$ N/m
- period of eigenvibrations T = 1,88 s
- eigenfrequency f = 0,53 Hz

If we compare above value with the eigenfrequency of the one segment (3 floor slabs), which is f = 4,69 Hz, the difference reaches one order of magnitude. This may be the explanation, that individual slabs could have been excitated by certain frequency spectrum, whereas slabs after compaction had not been displaced. It should be noted, that the frequency of vibrations can fall in with the eigenvibration frequency of the concrete-slab itself, which is about 16,6 Hz.
Similar stiffness considerations may furnish the explanation for differences in slabs displacements. It was observed especially in the proximity of column U (Fig. 1.1), that the displacements of slabs located in the midspan of beams (X-U), differ of about 5 centimeters from the displacements of slabs in the vicinity of column U. For slabs supported by beam on one side, and column on another one, spring constraint for lateral displacement is thereabout $7,8.10^6$ N/m, while for slabs on column-to-column support it is $5,2.10^6$ N/m. Since the local stiffness of structure in the vicinity of column U is about 50% smaller, it may be the reason for significant displacements when compared with midspan location of slab.

3. Experimental investigation of the kinematic conditions at the support of prestressed concrete slab

3.1. Aim and scope of investigations

The main goal of the investigations has been the friction phenomenon at the supports of prestressed concrete slabs resting upon steel girders. Taking into account the existance of rubber pads covered unilaterally with glue, it has been considered necessary to evaluate the friction influences among three different materials adhesing to each other at the supports: concrete slab, rubber band with glue and steel girders.
Main efforts were concentrated on the qualitative explanation of friction phenomenon and on revealing the factors influencing it. Experimental data were not submitted under rigorous statistical treatment, nevertheless the notable number of tests allows for good estimation of static and dynamic friction coefficients between respective materials and provides enough information to describe the dynamic mechanism of friction on the support.

3.1.1. Brief characteristic of the real structure

The real conditions, which were simulated in the laboratory are schematically outlined in Fig. 3.1.

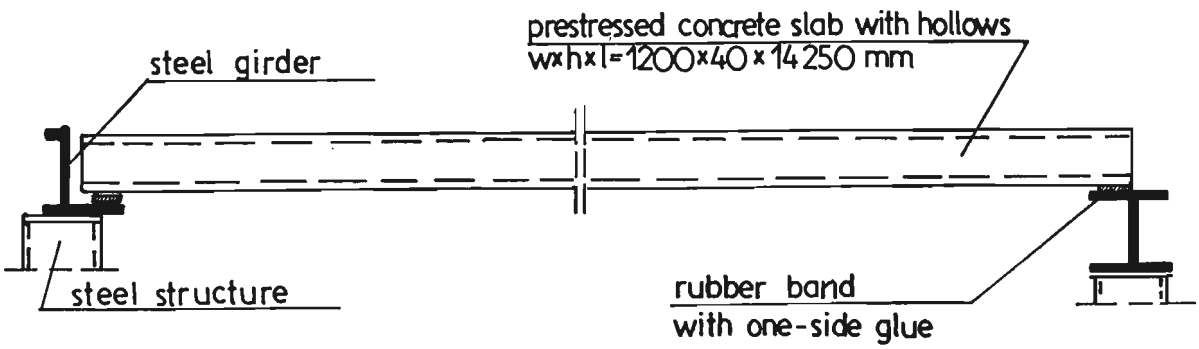


Fig. 3.1. Real support conditions.

The lower surface of prestressed concrete slab was typical for concrete elements manufactured in steel moulds. Steel profiles were rust-free, covered with anti-corrosion paint. Rubber band at the support was 80 mm in width and 4 mm thick. It was covered unilaterally by glue or rather a layer of adhesive agent for stabilizing the rubber band in straight line on steel beams. The weight of concrete slabs was 5,0 kN/m^2. It gives the unit pressure exerted on rubber band as 0.44 MPa. The assumed statical scheme of slab refers to the phase of assembling only - slab is free supported at both ends. Vertical reactions transfer on steel girders and eventual lateral loading is balanced by friction forces at the supports. As a next step of site-assembling, the reinforced concrete floor-ring is moulded along the supports, preventing lateral movements of slabs.

3.1.2. Basic physical relation

The basic parameter characterizing friction between two materials is coefficient of friction-f, defined as:

$$f = \frac{F}{R} \tag{3.1}$$

Where F- is lateral force inducing the displacement between bodies in the plane of friction, and R- is force acting perpendicular to the plane of friction (usually assumed as weight). Friction coefficients are distinguished as: static friction coefficient f_s, determined for the maximal lateral force inducing no displacement, and dynamic friction coefficient f_d, evaluated for objects moving with relation to one another. Theoretically, the only quantity characterizing all physical and mechanical properties of bodies in the plane of friction is friction coefficient. In the particular case under consideration, friction coefficients can be influenced by: statical scheme and loading conditions; adhesive layer on rubber band, the value of unit pressure exerted on rubber (mechanical characteristics of rubber may change due to strain rate).

3.2. Description of experimental investigation

All tests were performed in the laboratory of BKO - TU Eindhoven. One of the main goals was simulation of the real conditions of friction. Prestressed concrete slab with hollows was used. Its dimensions were w x h x l = 1200 x 300 x 4000 mm and total weight Q = 19,60 kN. Lower surface of the slab contacting steel form in the process of moulding was smooth - identical as in slabs with span l = 14250 mm. Also the rubber band was the same as in the original structure. Steel supports were assembled of profiles I HEA 300 and were jointed into rigid frame. Surfaces of steel supports were rust-free. They had not been painted for it was necessary to remove glue layer with a dissolver after each test. Concrete slab was supported on steel beams through rubber pad or steel roller 30 mm in diameter. Statical scheme changed slightly from one test to another - slab and rubber were moved a few centimeters to enable proper contact between elements and the support. Lateral force was put to concrete slab by means of hydraulic actuator with programmable displacement. Maximum displacement range in hydraulic actuator was 90 mm and it was also maximum shift of slab at the supports (comparing initial and final supports' location). Reactions on the supports were calculated for initial conditions at displacement $\Delta = 0$. Lateral force was transfered on slab through steel frontal plate. Load cell was included in loading arrangement. Lateral force F was registered as a function of controlled displacement of concrete slab. Values of F and Δ were monitored on X-Y plotter and simultaneously were measured automatically at the rate of 10 measurement/minute (for rate of $\Delta = 0.09$ mm/s) and 50 measurement/minute (for rate of $\Delta = 0.45$ mm/s). After each test the location of rubber band was controlled.
The overall view of experimental set-up is shown in Fig. 3.2 (see next page).

Experimental results were the basis for evaluation of dynamic and static friction coefficients for various loading conditions and different materials. The total number of performed tests was 34.
In two initial tests calibration of equipment was performed.

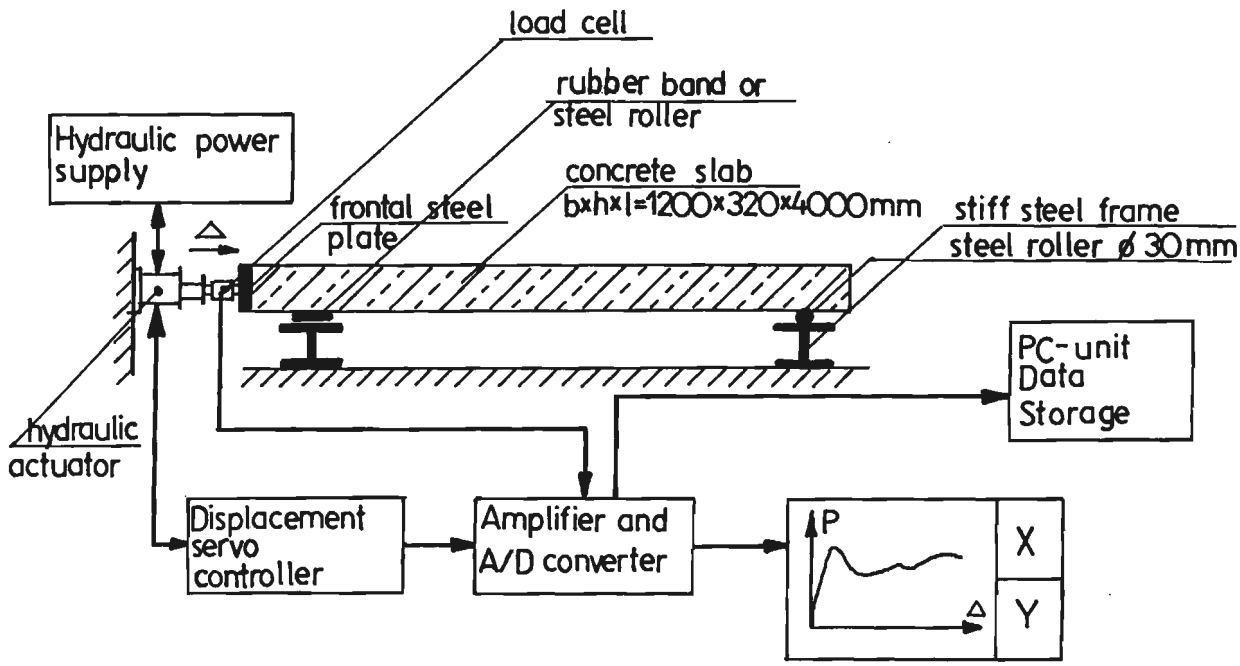


Fig. 3.2. Set-up of experimental equipment.

3.3. Factors affecting experimental results

Dynamic and static friction coefficients varied according to a kind of materials being in contact. Five basic configurations were taken under consideration:

(a) friction in real conditions (rubber's own glue only): surface of rubber covered with adhesive sticks to steel support and opposite side contacts the surface of concrete slab,

(b) friction between rubber and concrete: rubber is strongly fixed to steel support by epoxy glue. Friction appears between rubber and concrete only,

(c) friction between the rubber with adhesive and steel: surface with adhesive slides against steel support while opposite side of rubber is strongly fixed to concrete slab by epoxy glue,

(d) friction between rubber and steel: rubber's surface without glue slides against steel support while opposite side of rubber is fixed to concrete slab by epoxy glue,

(e) free friction in both planes: steel-rubber and rubber-concrete. Location of particular layers in different test arrangements is shown schematically in Fig. 3.3.

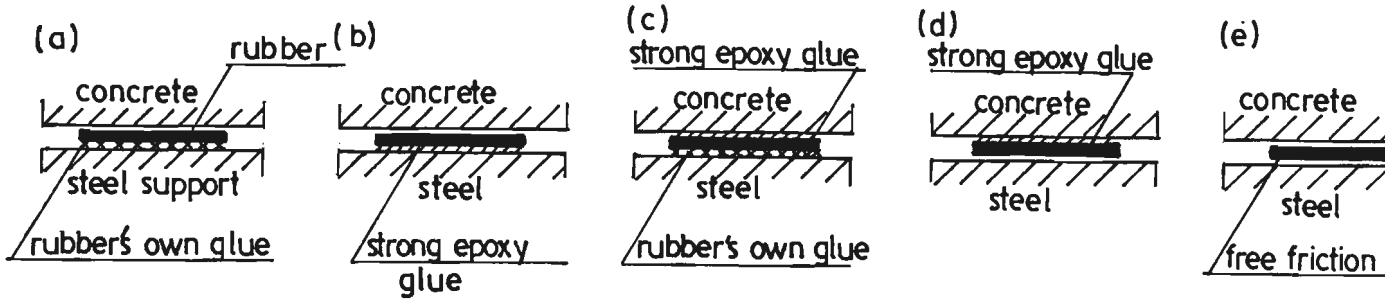


Fig. 3.3. Location of layers in different tests.

Other parameters which may influence friction are these, connected with loading conditions, in partricular:

- values of unit pressure at the supports (variations of friction coefficients entailed by changes in load),
- rate of displacement forced by hydraulic actuator,
- changes of static schemes in terms of mutual location of rubber and roller support.

Loading was transfered to concrete slab in terms of controlled displacement activated by hydraulic actuator. Three different displacement histories were applied in research program. Detailes are outlined in Fig. 3.4.

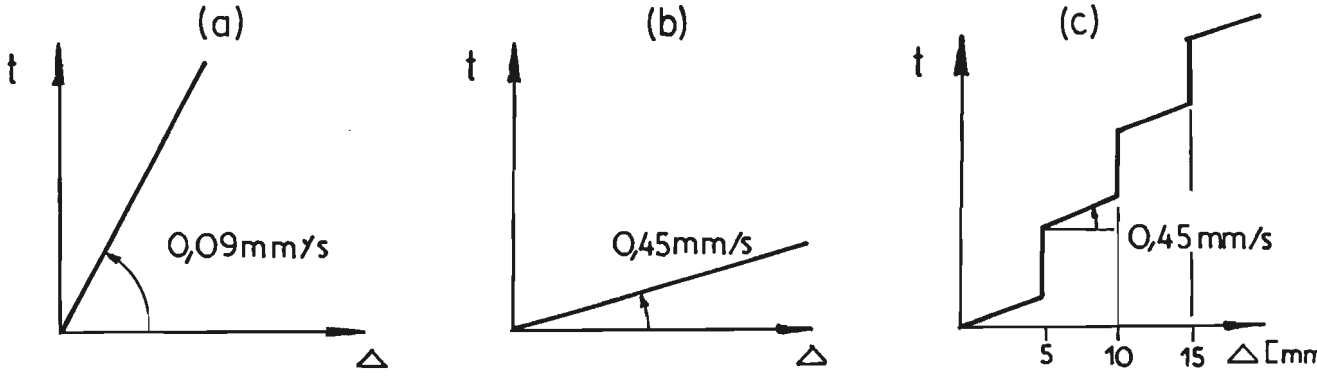


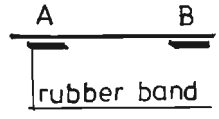
Fig. 3.4. Displacement histories applied in friction tests: (a) and (b) - constant rates of displacement, (c) - pulsating displacement.

The purpose of several tests was to evaluate the influence of location of rubber pads (left support, right support, both supports) on values of lateral force F. Friction on roller support was also investigated.

3.4. Experimental results

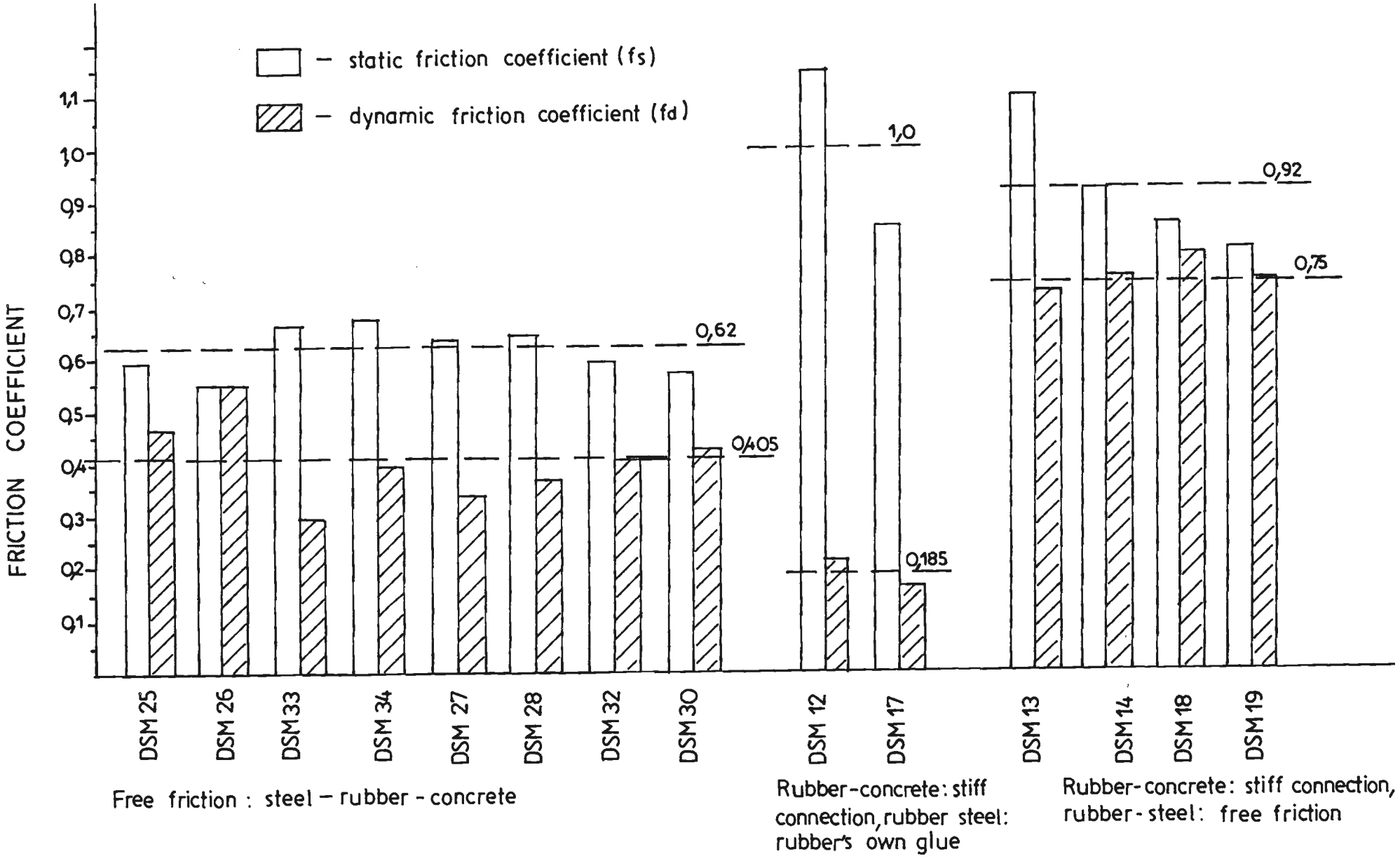
The results of experimental investigations are summarized in table 3.1. P-Δ and f-Δ curves for all tests are presented in the Appendix 2. On diagrams in Figures 3.5 and 3.6, the values of dynamic and static friction coefficients for various test conditions are compared. Dynamic values were calculated for minimum lateral force obtained in particular test. It is possible, making use of experimental data, to find the spectra of friction coefficients for different surfaces being in contact.
For real conditions, static friction coefficients are located in the range 0,51-0,74 mostly oscillating around mean value 0,61 (± 16%). Dynamic friction coefficients are much more lower 0,19-0,36 (mean value 0,27).

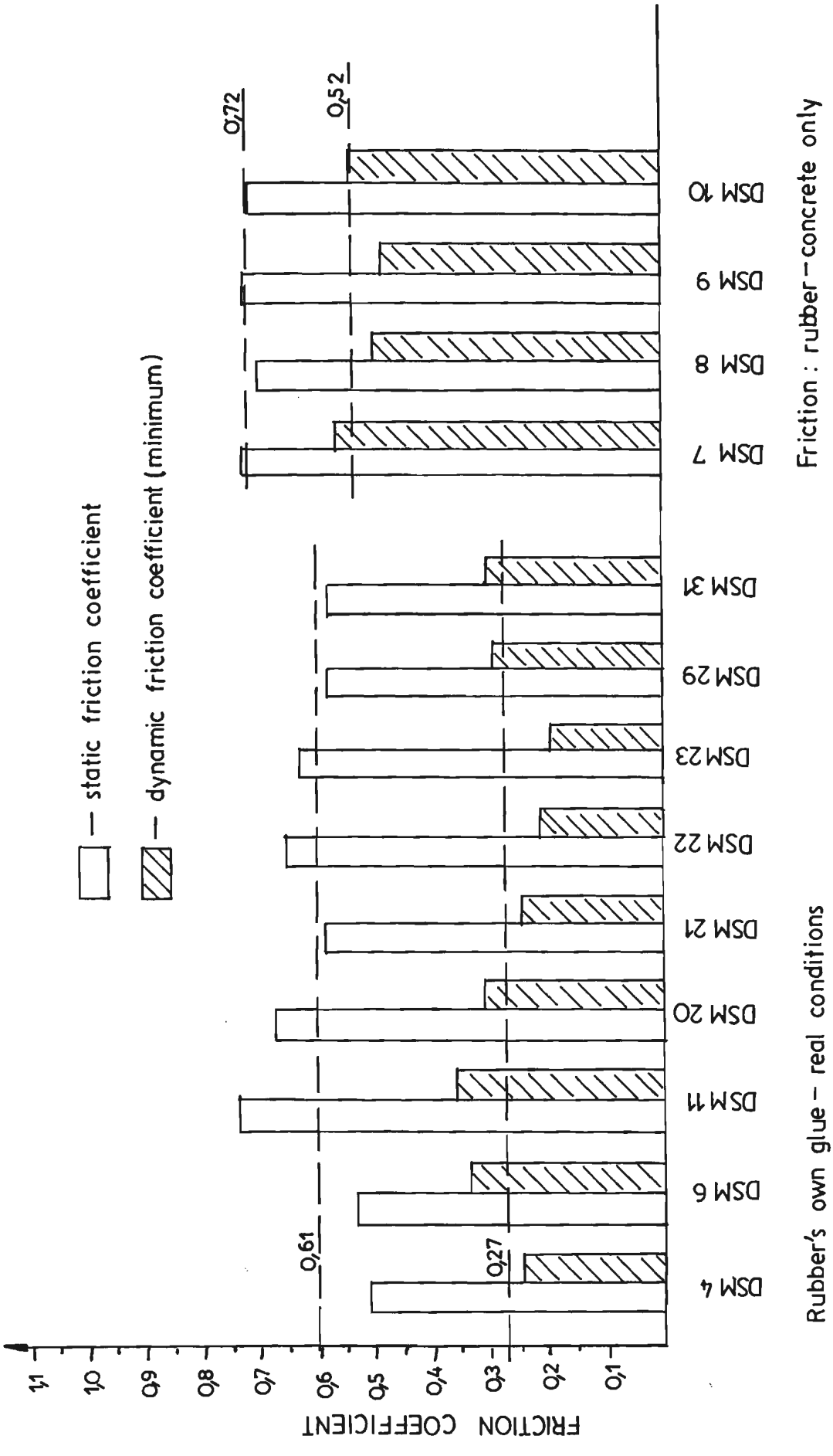
TABLE 3.1 TESTS CONDITIONS AND FRICTION COEFFICIENTS

no. of tests	statical scheme	friction's conditions rubber bxl [mm]	displacement rate mm/s	lateral force [kN] - static Fs - dynamic Fd	friction coefficients fs, fd	remarks
1	2	3	4	5	6	7
DSM3		rubber's glue + epoxy glue = weak mixture 40x1200	0.09	11.79 7.60	0.60 0.39	final properties of glue connection-undertermined
DSM4		rubber's own glue 40x1200	0.09	10.08 4.64	0.51	at the end of test-friction without glue
DSM5		rubber's own glue 40x1200	0.09	8.01 6.08	0.41 0.31	incorrect loading condition-first, uncontrolled initial displacement of plate
DSM6		rubber's own glue 20x1200	0.09	10.39 6.40	0.53 0.33	distinct decrease of friction due to formation of 'glue rollers'
DSM11		rubber's own glue 40x1200	pulsating load (0.45)	7.84 3.84	0.74 0.36	rubber on B-support
DSM20		rubber's own glue 20x1200	0.45	6.05 2.80	0.70 0.31	rubber in A-support, force F acts almost directly on a rubber
DSM21		rubber's own glue 20x1200	0.09	5.20 2.08	0.59 0.24	see above - different rate of displacement
DSM22		rubber's own glue 40x1200	0.45	5.68 1.84	0.66 0.21	in comparison with DSM20 no difference due to another width of rubber
DSM23		rubber's own glue 40x1200	0.09	5.35 1.60	0.61 0.19	see DSM22, no influence of displacement rate on the value of fs
DSM29		rubbers's own glue 20x1200	0.45	8.98 4.56	0.58 0.29	shifting of the A support. Bigger unit pressure than in DSM20
DSM31		rubber's own glue 20x1200	pulsating load (0.45)	8.78 4.32	0.56 0.31	displacement rate doesn't influence static friction - see DSM29

no. of tests	statical scheme	friction's conditions rubber bxl [mm]	displace-ment rate mm/s	lateral force [kN] - static Fs - dynamic Fd	friction coefficients fs, fd	remarks
1	2	3	4	5	6	7
DSM25		free fiction 40x1200	0.45	5.15 4.16	0.59 0.47	tests repeated with the same rubber as in DSM24 (DSM24 - failure of the equipment)
DSM26		free fiction 40x1200	0.09	4.64 4.72	0.55 0.55	curves of DSM25 and DSM26 coinci-de - no influence of displacement rate
DSM33		free fiction 40x1200	0.45	7.42 3.12	0.68 0.29	shifting of the A support
DSM34		free fiction 40x1200	0.09	7.42 4.36	0.68 0.40	see DSM33 - no influence of displac ment rate on fs
DSM27		free fiction 40x1200	0.09	9.46 5.20	0.61 0.33	more shifting on th A support
DSM28		free fiction 40x1200	0.45	9.92 5.84	0.63 0.37	see DSM27 - no influence of displac ment rate on fs
DSM32		free fiction 20x1200	pulsating load (0.45)	9.19 6.40	0.59 0.41	no big influence of unit pressure and displacement rate o fs - see DSM27 and DSM28
DSM30		free fiction 20x1200	0.45	8.87 6.56	0.57 0.42	no influence of displacement rate o fs - see DSM32
DSM11		steel rollers only	0.09	0.07 0.28	0.004 0.014	small influence of rollers' friction
DSM12		steel rollers only	0.45	0.10 0.55	0.005 0.02	see above
DSM24	Equipment's failure					

no. of tests	statical scheme	friction's conditions rubber bxl [mm]	displacement rate mm/s	lateral force [kN] - static Fs - dynamic Fd	friction coefficients fs, fd	remarks
1	2	3	4	5	6	7
DSM7		friction between rubber and concrete only 40x1200	0.09	14.28 11.28	0.73 0.57	rubber fixed to steel support with strong epoxy glue to prevent movement
DSM8		fiction between rubber and concrete only 40x1200	0.09	13.87 9.84	0.71 0.50	small influence of displacement rate - see DSM9, DSM10
DSM9		friction between rubber and concrete 40x1200	0.45	14.10 9.44	0.72 0.48	see above
DSM10		fiction between rubber and conrete 40x1200	pulsating load (0.45)	13.94 10.40	0.71 0.53	see above
DSM12		fiction between rubber and concrete - prevented, rubber's own glue 40x1200	0.45	11.79 2.24	1.14 0.21	rubber on B support
DSM17		fiction between rubber and concrete prevented rubber's own glue 40x1200	0.45	7.38 1.44	0.85 0.16	small dynamic friction due to formation of glue rollers between stiff planes (steel and concrete)
DSM13		fiction between rubber and concrete prevented by epoxy glue 40x1200	0.45	11.25 kN 7.52	1.08 0.72	high friction between rubber and steel-cohesion
DSM14		fiction between rubber and concrete prevented by epoxy glue 40x1200	0.09	9.42 7.68	0.90 0.74	high friction between rubber and steel
DSM18		fiction between rubber and concrete prevented by epoxy glue 40x1200	0.45	7.38 6.80	0.85 0.78	curves of DSM18 and DSM19 coincide, high fricton
DSM19		friction between rubber and concrete prevented by epoxy glue 40x1200	0.09	7.03 6.48	0.82 0.75	see above


— static friction coefficient (fs)
— dynamic friction coefficient (fd)
FRICTION COEFFICIENT
1,1
1,0
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0,62
0,405
1,0
0,185
0,92
0,75
DSM 25
DSM 26
DSM 33
DSM 34
DSM 27
DSM 28
DSM 32
DSM 30
DSM 12
DSM 17
DSM 13
DSM 14
DSM 18
DSM 19
Free friction : steel — rubber - concrete
Rubber-concrete: stiff connection, rubber steel: rubber's own glue
Rubber-concrete: stiff connection, rubber - steel: free friction


FRICTION COEFFICIENT
1,1
1,0
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0,61
0,27
0,72
0,52
DSM 4
DSM 6
DSM 11
DSM 20
DSM 21
DSM 22
DSM 23
DSM 29
DSM 31
DSM 7
DSM 8
DSM 9
DSM 10
— static friction coefficient
— dynamic friction coefficient (minimum)
Rubber's own glue – real conditions
Friction : rubber – concrete only

Static friction between rubber and concrete is characterized by mean value 0.72 with small scatter of results (± 4%). Dynamic friction is, in this case, 0,48-0,57 (mean value 0.52). For rubber and steel static friction is very high 0,81-1,09 (mean value 0.82) and is acompanied by high dynamic values 0,72-0,78 (mean value 0.75). If there is a layer of cohesive between steel and rubber band, static friction reaches 1,14 but values of dynamic friction coefficient are very low 0,16-0,21. Big friction between steel and rubber may be connected with adhesive forces in contact plane of these two materials. In the case of free friction among all three materials (without any glue), global friction coefficient is 0,55-0,68 (static) and 0,29-0,55 (dynamic).

In several tests the influence of location of rubber band (left support, right support) on the level of maximum lateral force at friction was observed. If rubber pads are on both supports, a global value of friction is attained. One can calculate it for a given lateral force and overall weight of a slab. Having placed rubber band only on one of the supports one gets different coefficients of friction (Fig. 3.7). Results are shown on diagrams in Fig. 3.8. That phenomenon may be connected with the additional moment coming from eccentricity of lateral force with respect to the axis of supports. Possible explanation of that effect is briefly outlined in Fig. 3.9.

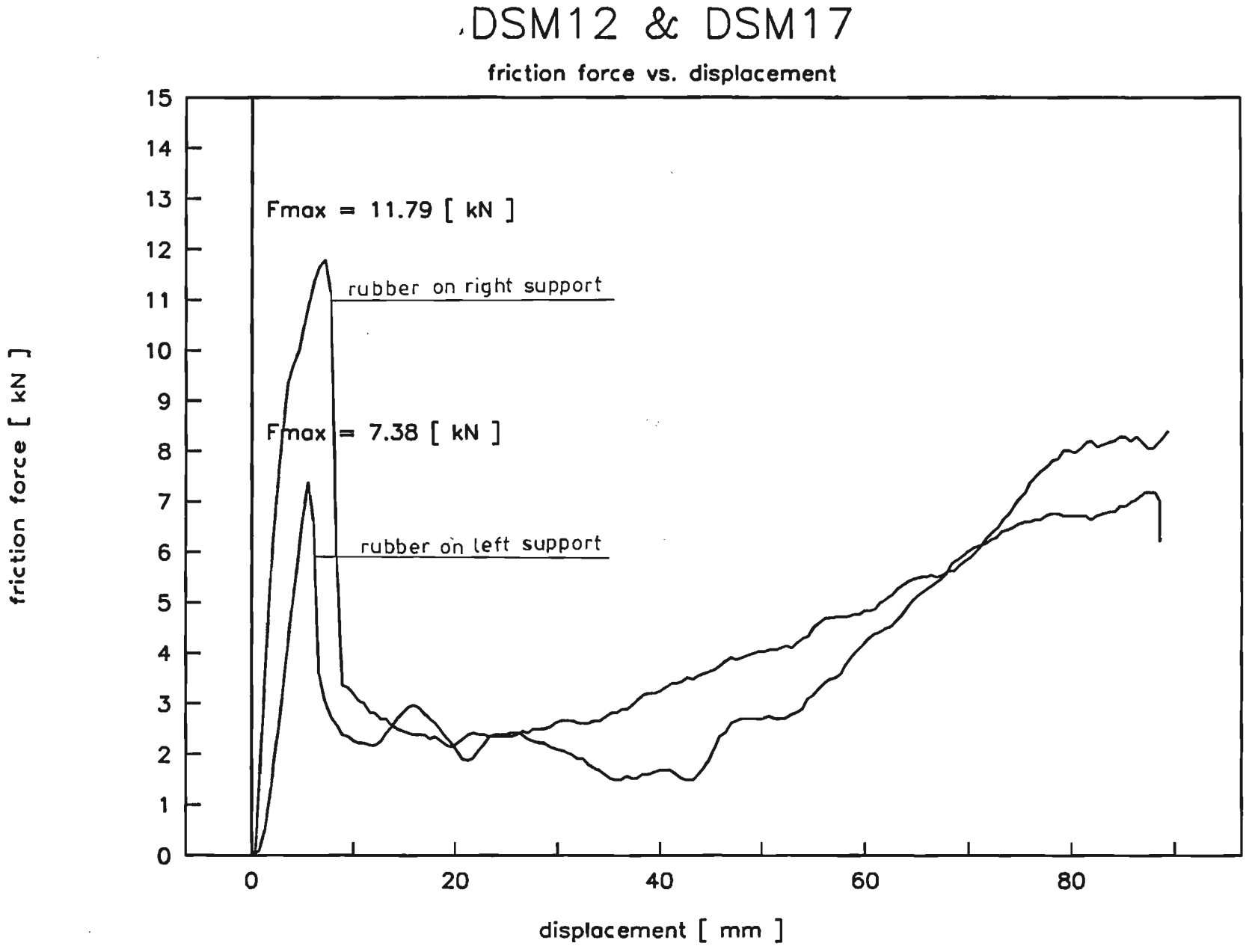


Fig. 3.7. Changes of maximum lateral force F due to rubber band location.

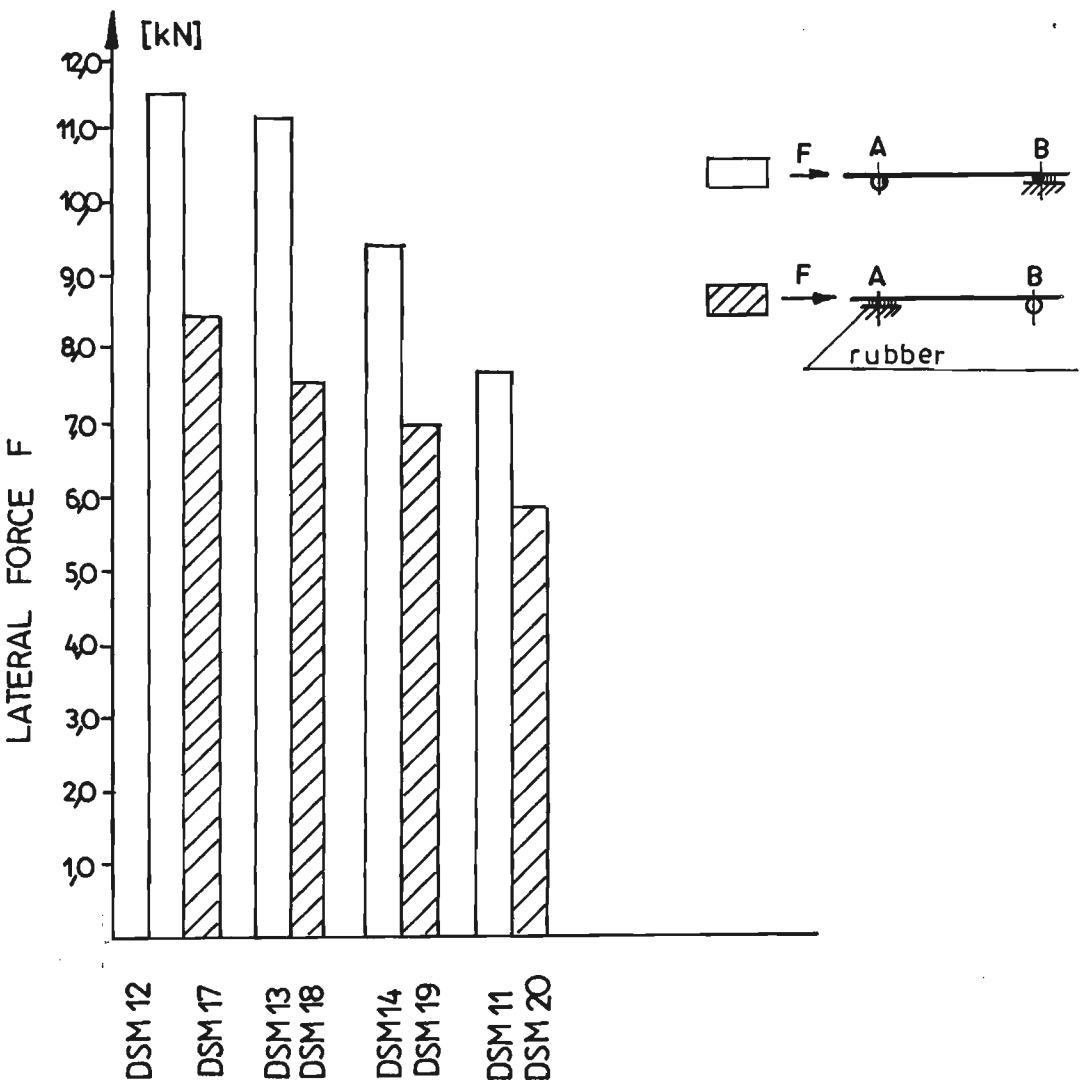


Fig. 3.8. Influence of location of rubber band on the level of maximum lateral force F.

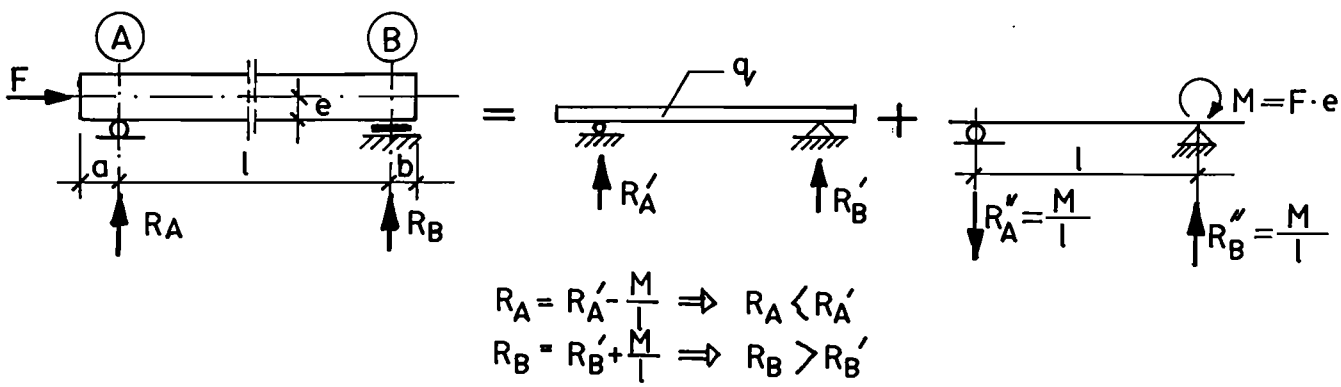


Fig. 3.9. Decomposition of static scheme due to additional moment provided by the eccentricity 'e' of lateral force F. Reaction on 'B' support increases, on 'A' support decreases.

A part of tests was arranged to find eventual connection between the level of vertical loading, or unit pressure at the support, and the values of friction coefficients. By using rubber bands of different sizes (20 mm and 40 mm in width) it was possible to submitt rubber bands under various compression rates. The same result was attained in some tests by replacing the roller support in reference to concrete slab. Results are reported in Fig. 3.10.

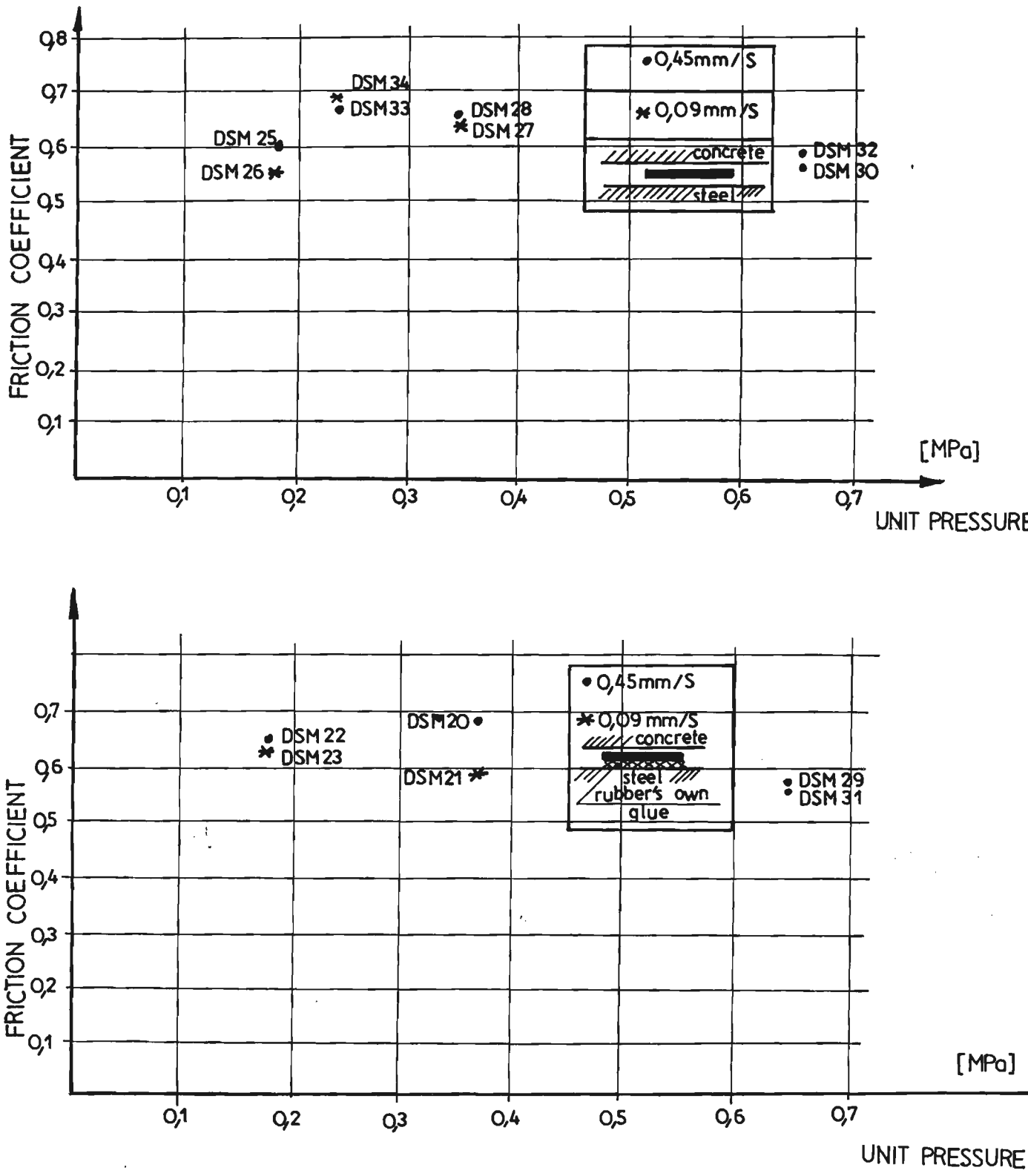


Fig. 3.10. Influence of unit pressure at the support on friction coefficient (static value).

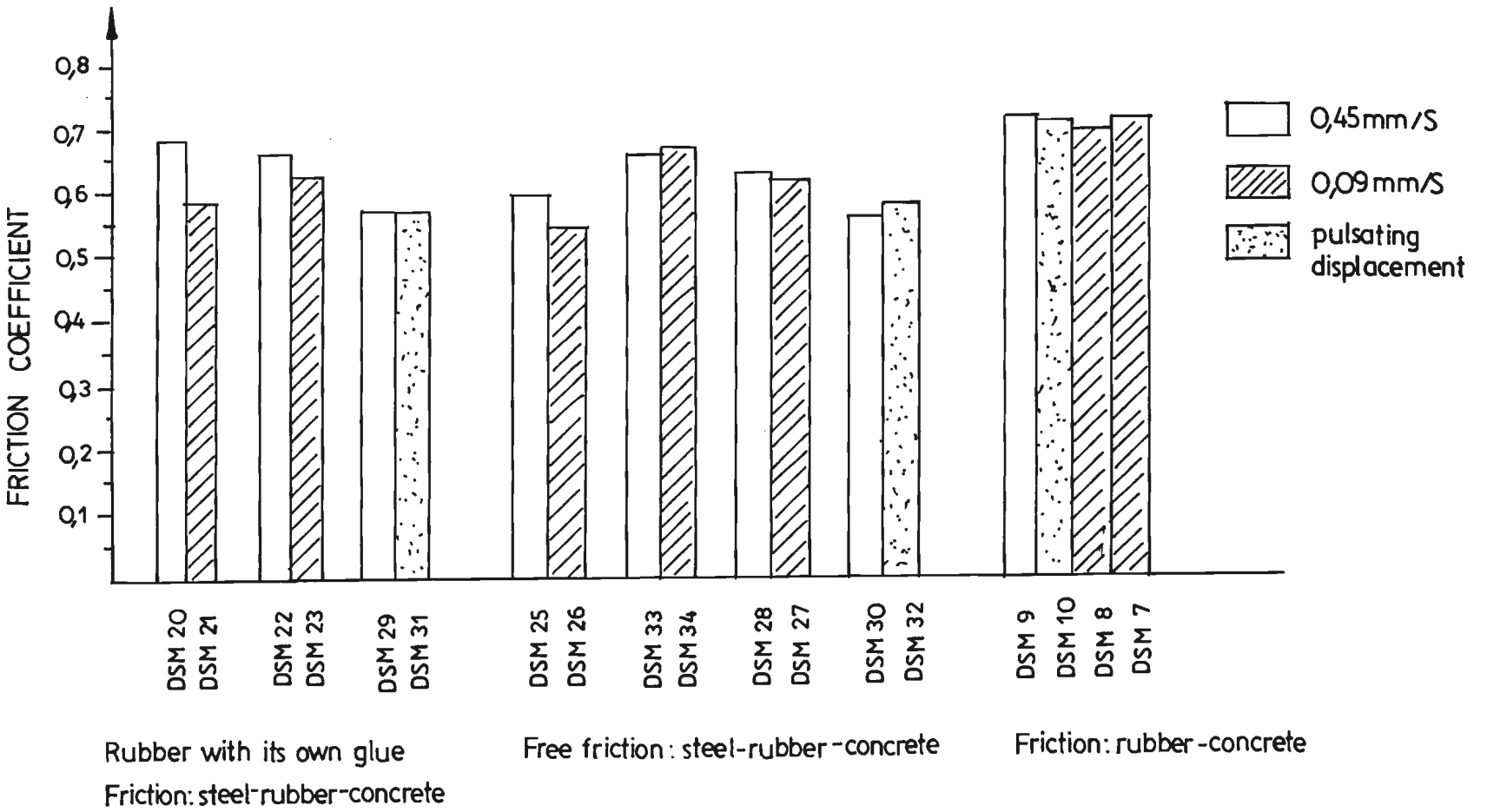


Fig. 3.11. Influence of displacement rate on values of friction coefficients for various friction conditions.

The explicit connection between the values of friction coefficients and unit pressure has not been observed.
Comparison of the results registered at different displacement rates (see Fig. 3.10) does not show the distinct relation between friction coefficients and the rate of displacement also. Results of investigation are shown on diagrams in Fig. 3.11.

In two additional tests the friction force on steel rollers was studied. Maximum values of lateral force are in the range 0,28-0,44 kN and have $\pm$ sign. Negative values of lateral force arise from unevenness of surfaces taking part in friction process. The friction on roller supports has not been taken into account in the calculations of friction coefficients.

3.5. Mechanism of friction at the supports of real structure

Detailed analysis of the experimental results revealed big influence of adhesive layer between rubber and steel (so-called 'rubber's own glue') on static and dynamic friction process.
Tests performed in the same conditions, except for the presence of a glue layer, proved the existence of characteristic decrease of friction just at the beginning of dynamic range. That phenomenon is independent of displacement rate. Some test results are shown in Fig. 3.12 and Fig. 3.13. The range of dynamic friction depression depends on the width of rubber band. The width of rubber is in direct relation with the quantity of glue in contact layer. The more glue, the wider is the range of 'friction depression'. For rubber band of 20 mm in width, F-Δ curve is shown in Fig. 3.14. The curve for rubber band of 40 mm in width is shown in the same Fig. 3.14. For narrower rubber the range of 'friction depression' is smaller than for broader one.
It seems, that when the movement between steel and rubber commences, glue on the rubber acts as a "greasing agent" between the planes of friction. Glue is formed into thin 'rollers', which facilitate friction. In every test with so-called 'rubbers own glue', 'glue rollers' were found on the surface of steel support. Making use of that empirical observation, mechanism of friction has been divided into 3 phases presented in Fig. 3.15.

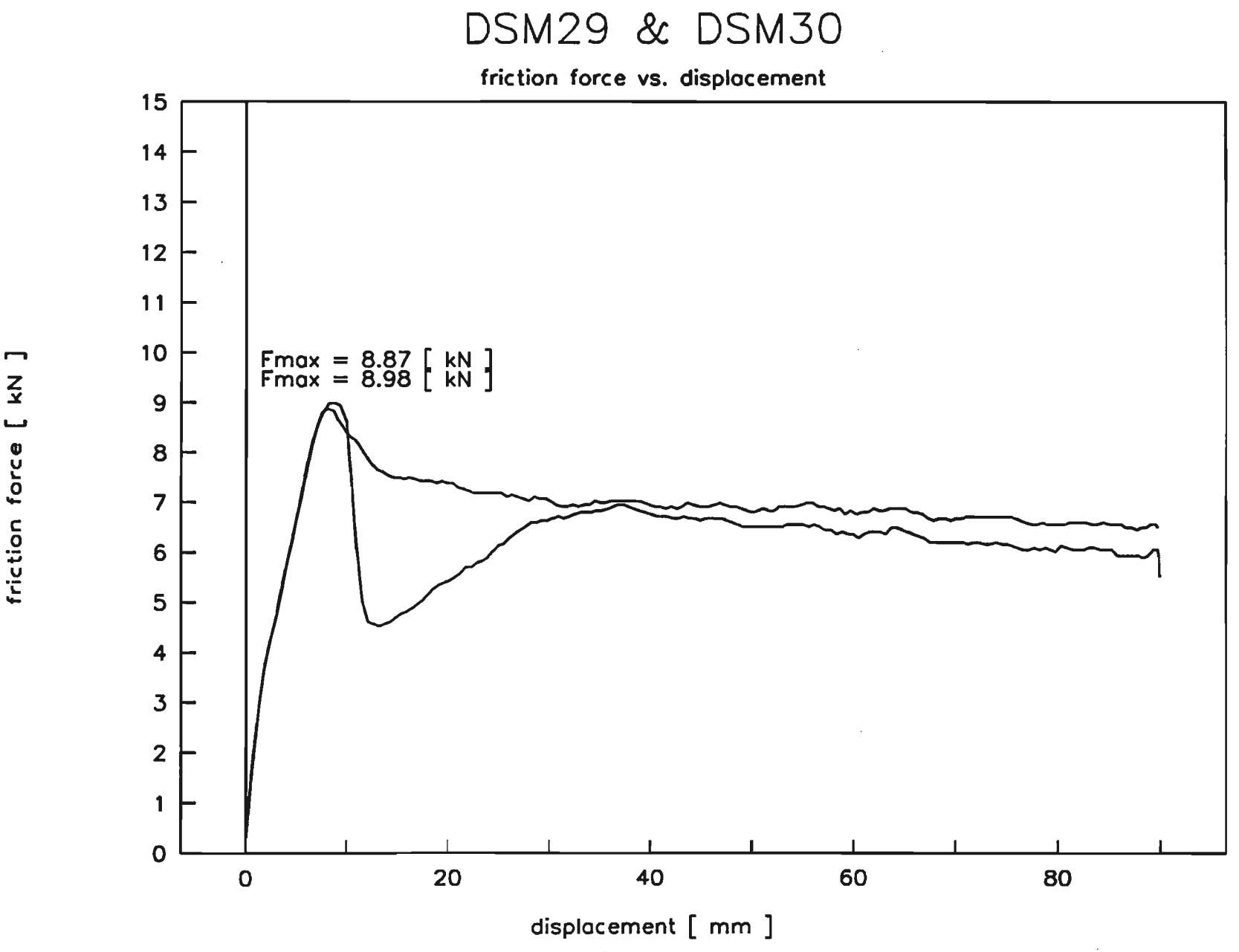


Fig. 3.12. Decrease of friction due to the presence of glue layer -

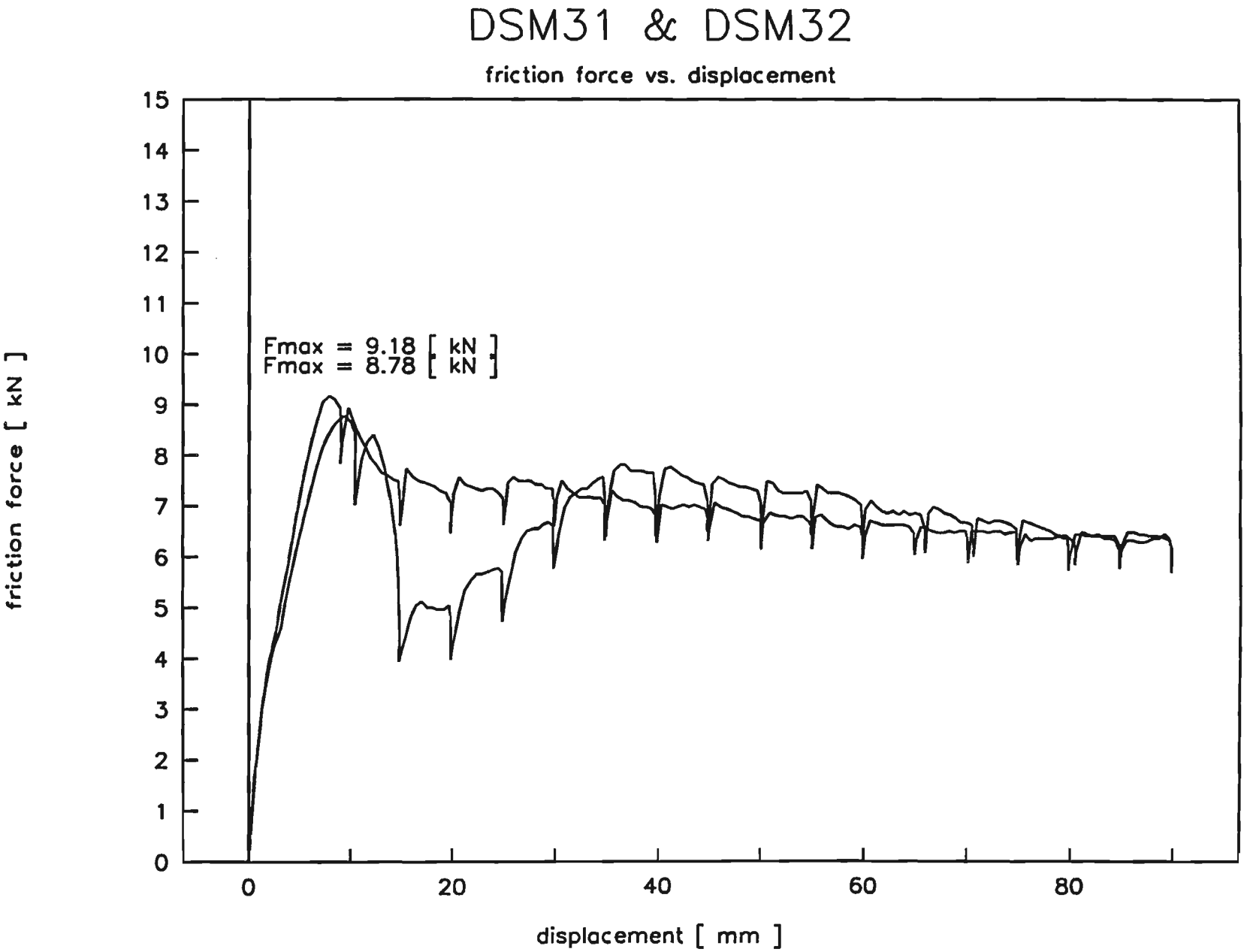


Fig. 3.13. Decrease of friction due to the presence of glue layer -

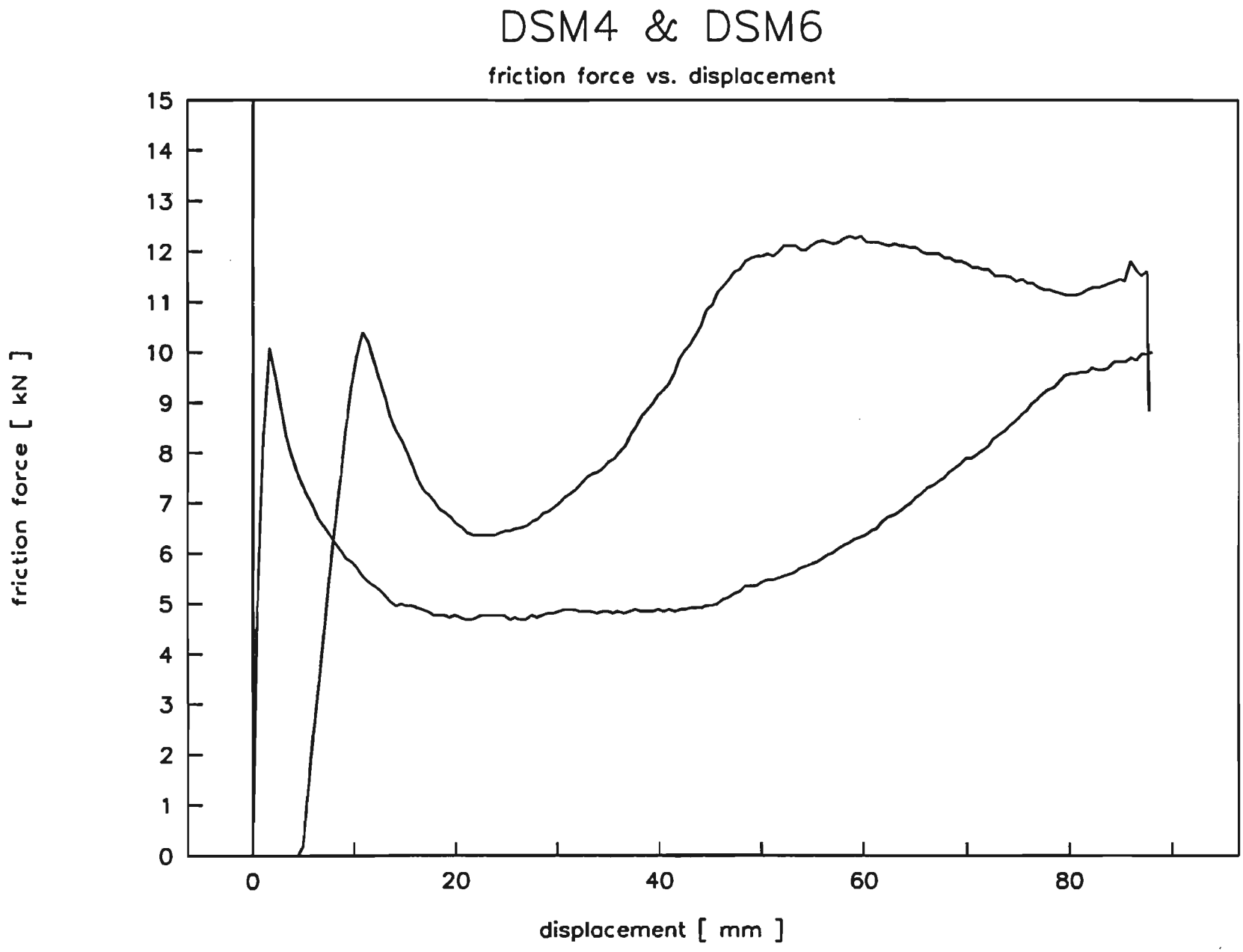


Fig. 3.14. 'Friction depression' for rubber band of 20 and 40 mm in width.

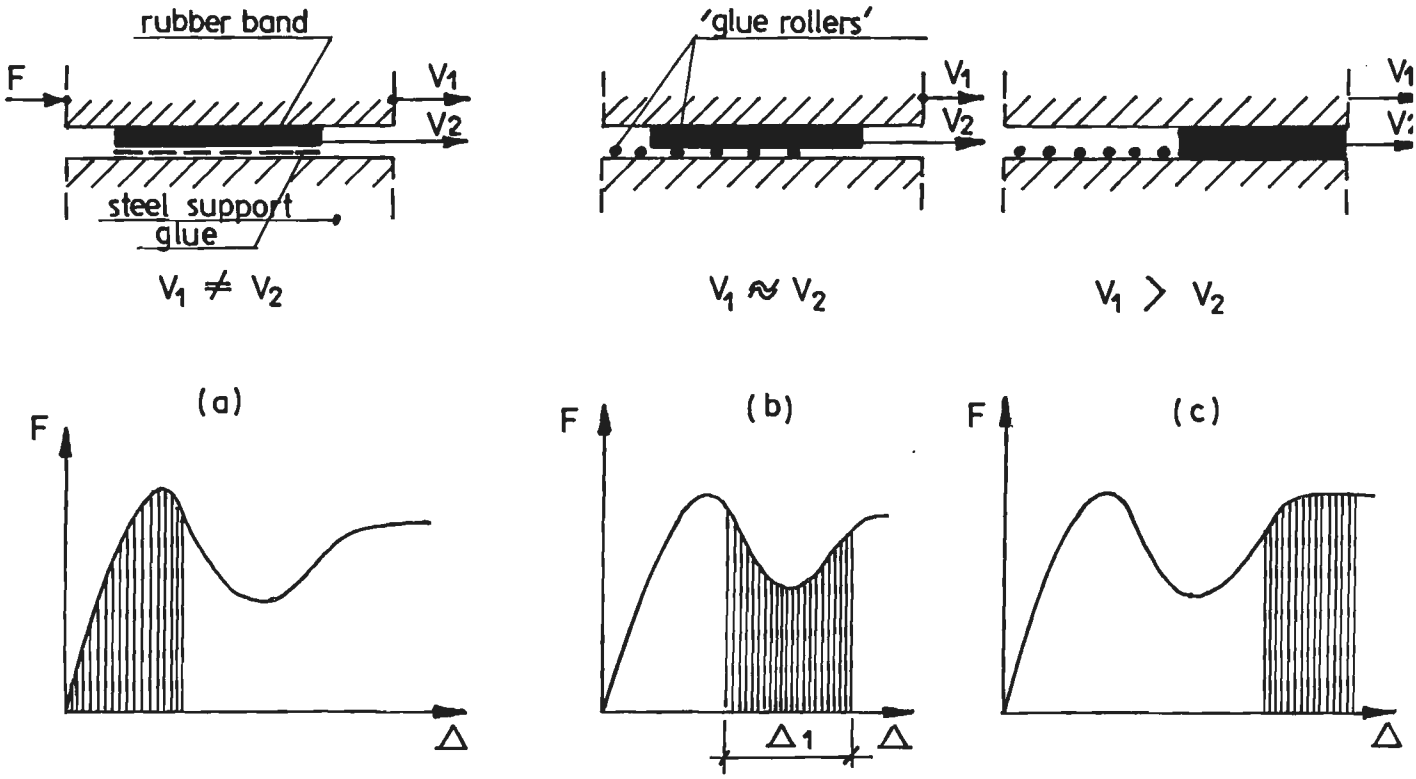


Fig. 3.15. Mechanism of friction:

(a) friction commences in both planes, concrete-rubber and rubber-steel. Before static coefficient of friction is reached, rubber deforms elastically and plastic effects under frontal steel plate occur. Velocity of concrete slab (v_1) is differentm from velocity of rubber band (v_2);

(b) process of 'glue rollers' formation begins. Friction decreases and proceeds mainly between rubber band and steel support. Velocities v_1 and v_2 are bringing near;

(c) movement occurs between concrete and rubber due to lower friction coefficient $(f_{c-r} < f_{r-s})$ and concrete slab moves in reference to rubber band $(v_1 > v_2)$.

In the phase (a), lateral force increases from 0 to the value of maximum static friction. The rate of its increasing depends partially on displacement rate and on effects in contact plane between frontal steel panel and concrete slab. After the value of static friction coefficient is reached, friction takes place in both planes of contact: concrete - rubber, and rubber with glue - steel. Rubber band displaces with reference to concrete and steel (global friction coefficient 0,55-0,6), so velocities of concrete slab (v_1) and rubber (v_2) differ ($v_1 \neq v_2$).

In the phase (b), the decrease of friction coefficient due to formation of 'glue rollers' is strongly marked. Width of rubber band influences the range of 'friction depression' - Δ_1. Since dynamic friction coefficient between concrete and rubber (0,52) is much more higher than friction coefficient in the plane with glue layer (0,185), rubber does not move in reference to concrete ($v_1 \approx v_2$) but slides along steel support.

In the phase (c) 'glue rollers' remain on steel surface behind rubber band and friction takes place in rubber - concrete plane for friction coefficient of rubber - concrete (~ 0,52) is lower than friction coefficient of rubber - steel (~ 0,75). Velocity of rubber band with respect to steel support (v_2) is small in comparison with concrete slab velocity ($v_1 > v_2$).
One should keep in mind, that friction mechanism described above is only an approximation of the real process, which is strongly influenced by materials heterogeneities and surface defects.

3.6. Conclusions

Detailed analysis of experimental data made possible formulation of conclusions, important for dynamic analysis of the real structure:

- explicit connection between the values of friction coefficients and the level of vertical loading or unit pressure at the support has not been observed,
- comparison of the results registered at different displacement rates (0.09 mm/s, 0,45 mm/s, pulsating displacement) does not show the distinct relation between friction coefficient and rate of displacement. For real-structure conditions, five-times increase of displacement rate of concrete slab results in 5 - 15% increase of static and dynamic friction coefficient,

- when rubber pad is placed only on one support its location (left, right support) in reference to the point of transfer of lateral force on concrete slab affects the values of friction coefficients. Friction at the support which is more distant from actuator is higher. It may be due to the additional moment coming from eccentricity of lateral force with respect to the axis of supports,
- maximum values of lateral forces on supports with the steel rollers are relatively small (0.28-0.44 kN) and have $\pm$ sign. Negative values of lateral force arise from unevenness of surfaces. The friction on roller supports has not been taken into account in the calculations of friction coefficients,
- global value of static friction coefficient for real-structure conditions, at the support of concrete slab, may be assumed as 0.55-0.60. When the phenomenon of 'glue rollers' formation occurs, the values of dynamic friction coefficient may be even three times lower and attain the range 0,19-0.36,
- keeping in mind the fact that 'friction depression', connected with 'glue rollers' creation, commences after 2-5 mm displacement of concrete slab, possible initiation of this process should be taken into account. In the moment of placing of a concrete slab on support, small movement of rubber band may be forced by crane or slab-sling. It leads directly to the situation when real friction coefficient is very low (~ 0,2).

The investigation of friction phenomenon at the support of concrete slab provides data necessary for dynamic analysis of structure.

4. Experimental analysis of the traffic induced vibrations

4.1. Methods of measurement

The instant values of acceleration were recorded in four measurement points at the vicinity of DSM lab. Signal from accelerometers was continuously recorded on digital type recorder. At the same time signal was monitored on osciloscope with the printer. The measurement set-up is outlined in Fig. 4.1.

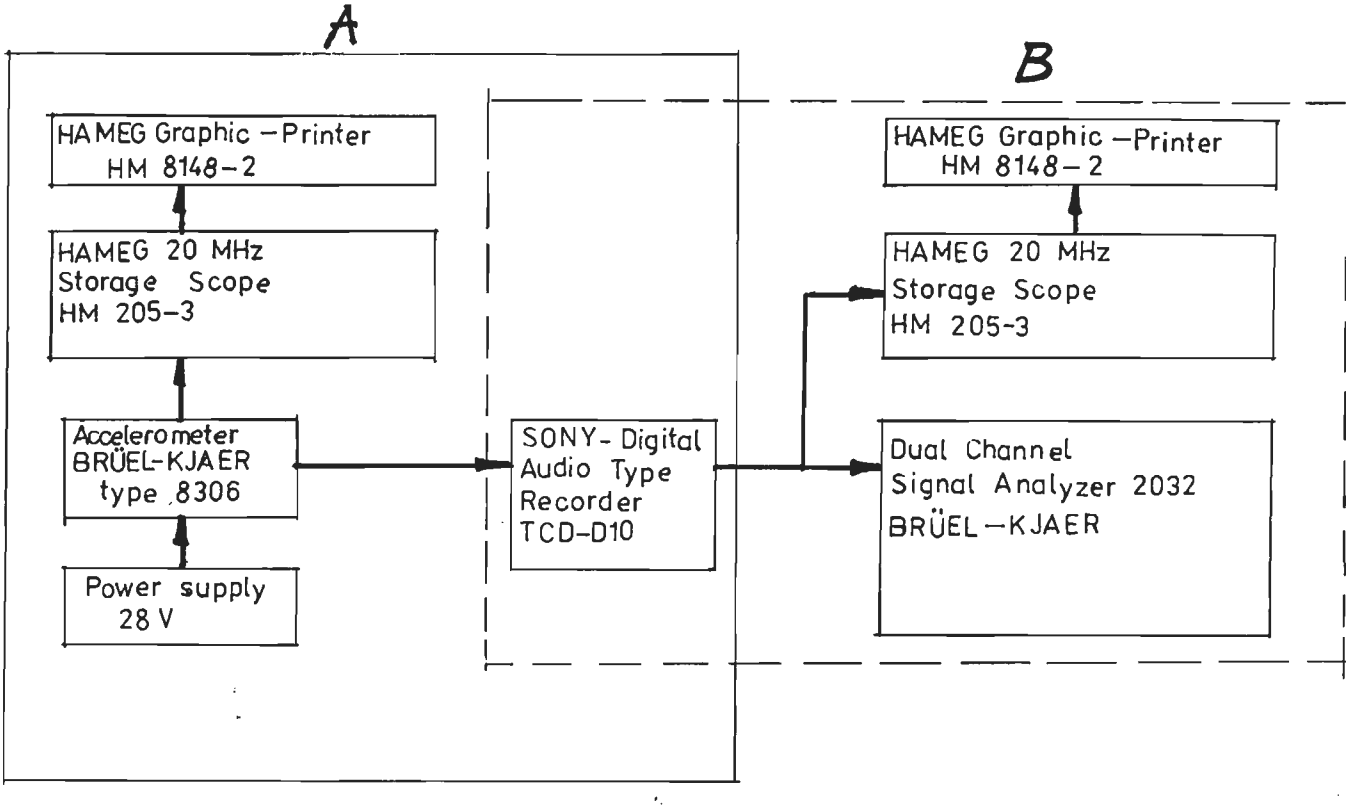


Fig. 4.1. Experimental set-up for acceleration measurement (A), and Fourier analysis of vibration (B).

Broken line separates the figure into two parts A and B. Part A concerns the equipment configuration during measuring of the accellerations, while part B pertains to the Fourier analysis of the signals, performed thereafter on digital analyser. The overall time of data recording at four points was about five hours. The proper location of measurement points brought about some difficulties.

For the reason, that the global stiffness of actual structure differs fundamentally from the stiffness of one-storey beam-column-slab system, the vibrations recorded on structural elements may yield only quantitative information about frequency spectrum. Furthermore, the direct measurements of the ground vibrations faced the problem of ground decohesion. The upper surface of soil is of the made-ground type. Finally, four points of accelleration measurement were chosen:
two of them on structural elements and two on small concrete elements far from the lab building. These points are shown schematically in Fig. 4.2., which is also a site-plan. (see next page).

Point A is a concrete pedestal of steel gate-column embeded in concrete slab of pavement.
Second (B), is a reinforced concrete fence-column embeded directly into the ground. Moreover, some control records were done on the structural column inside the building (point C) and on the uncovered crest of the outside fire-escpe stairway foundation, reinforced with ground pile (point D). At the distance 51,5 m from the lab building, there is an asfalt smooth road to DSM. Heavy trucks (50 to 70 t) often pass by 24 hours a day. After next 55 m there is a similar road, separated by trench 2,5 x 4,0 m, and finally after 20 m runs a highway on embankement 5 m in height.

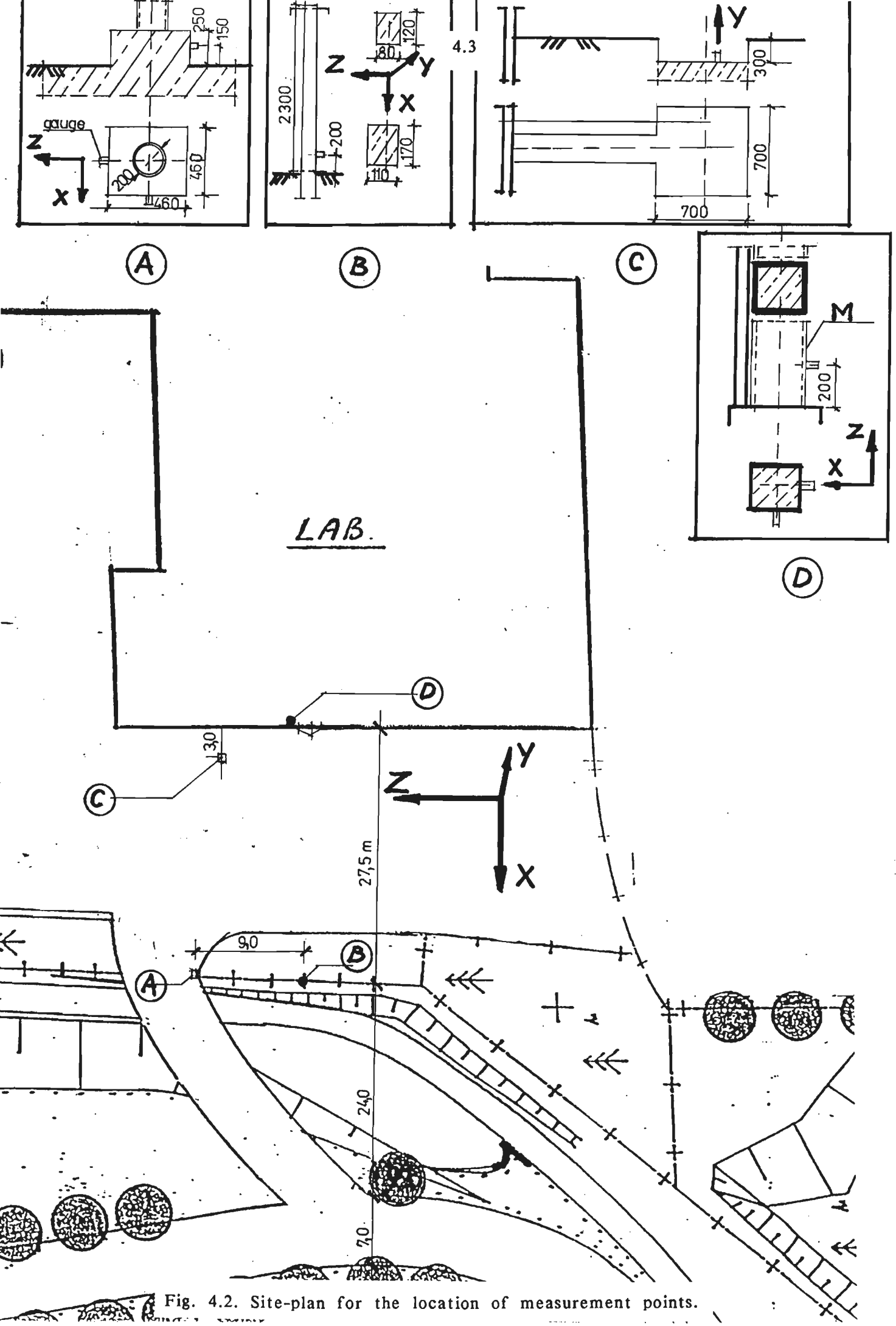


Fig. 4.2. Site-plan for the location of measurement points.

Measurements at points A, D were recorded in time period 11.40 - 14.30 on 5th March 1992, and at points B, C on 16th March, 18.50 - 20.50 hrs. They were conducted in three perpendicular directions (X,Y,Z). In Fig. 4.3, typical accelleration spectra for minor and intensive traffic are presented. The location and direction of measurements are in accordance with Fig. 4.2.

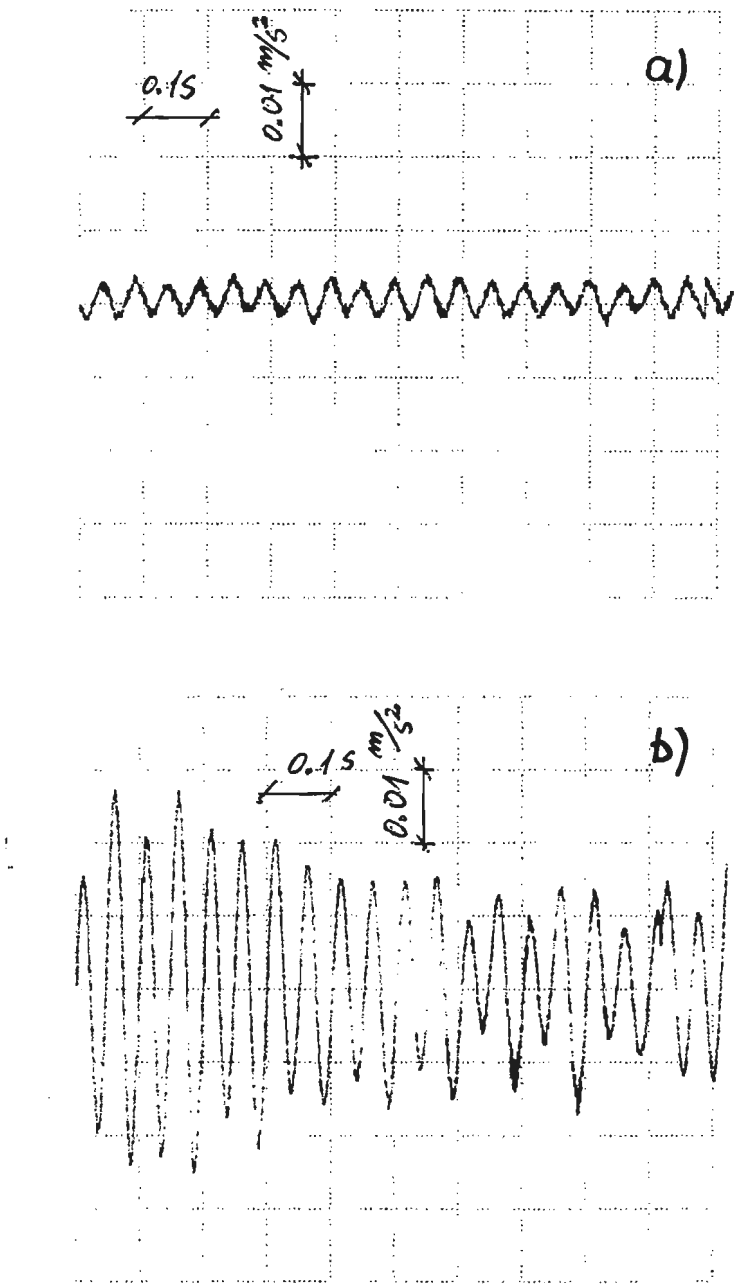


Fig. 4.3. Typical time-accelleration spectra for minor (a) and intensive traffic (b).

4.2. Fourier analysis of vibrations

Any exitation A(t) (acceleration function) which is periodic over an interval t_1 can be decomposed into a constant part and a series of harmonic contributions which, when superimposed, result in the total acceleration-time function given. This harmonic decomposition results in a Fourier series for the excitation, as follows:

$$A(t) = A_0 + \sum_{i=1}^{\infty} [a_i \cos(i\omega t) + b_i \sin(i\omega t)] \tag{4.1}$$

$$A_0 = \frac{1}{t_1} \int_0^{t_1} A(t)dt \tag{4.2}$$

$$a_i = \frac{2}{t_1} \int_0^{t_1} A(t) \cos(i\omega t)dt \tag{4.3}$$

$$b_i = \frac{2}{t_1} \int_0^{t_1} A(t) \sin(i\omega t)dt \tag{4.4}$$

in which $\omega = 2\pi f$ is the fixed repetition frequency of the excitation corresponding to the period t_1. The integer i is the index number of the harmonic components. The frequencies of the harmonic components are multiples of the frequency ω. An alternative way of writing the i^{th} component of the acceleration is:

$$A_i(t) = a_i \cos(i\omega t) + b_i \sin(i\omega t) = F_1 \sin(i\omega t - \phi_i) \tag{4.5}$$

with an acceleration magnitude F_i and phase angle ϕ_i. These quantities are given by:

$$F_i = (a_i^2 + b_i^2)^{0,5} \tag{4.6}$$

$$\phi_i = -\text{arctg}\ (ai/bi) \tag{4.7}$$

For many practical purposes the Fourier series is expressed as the Fourier sum:

$$A(t) = A_0 + \sum_{i=1}^{n} A_0 \alpha_i \sin(i\omega t - \phi_i) \qquad (4.8)$$

where A_0 is the mean value of the acceleration waveform.
The Fourier coefficients α_i then indicate the relative magnitude of the i^{th} component of the acceleration waveform. The i^{th} component of the acceleration waveform is then often given as:

$$F_i = A_0 \alpha_i \qquad (4.9)$$

The result of the harmonic analysis of the acceleration is commonly shown as a graph of the Fourier component amplitude F_i vs i or frequency. This kind of plot is known as a discrete Fourier amplitude spectrum.
Fourier analysis is highly recommended for transient vibration. One of those cases are also vibrations induced by road traffic. The example of acceleration amplitudes measured upon concrete pole in the vicinity of a road (DSM) is given in Fig. 4.4.

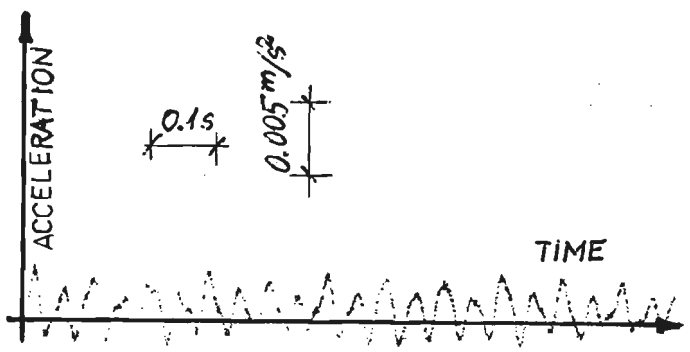


Fig. 4.4 Traffic induced vibrations: acceleration vs. time.

Their periodic but irregular waveform is clearly observable.
Fourier analysis of acceleration spectrum was performed on digital signal analyser. Typical printouts of data, coming off from digital analyser are shown in Fig. 4.5. They pertain to the vibrations from Fig. 4.4.

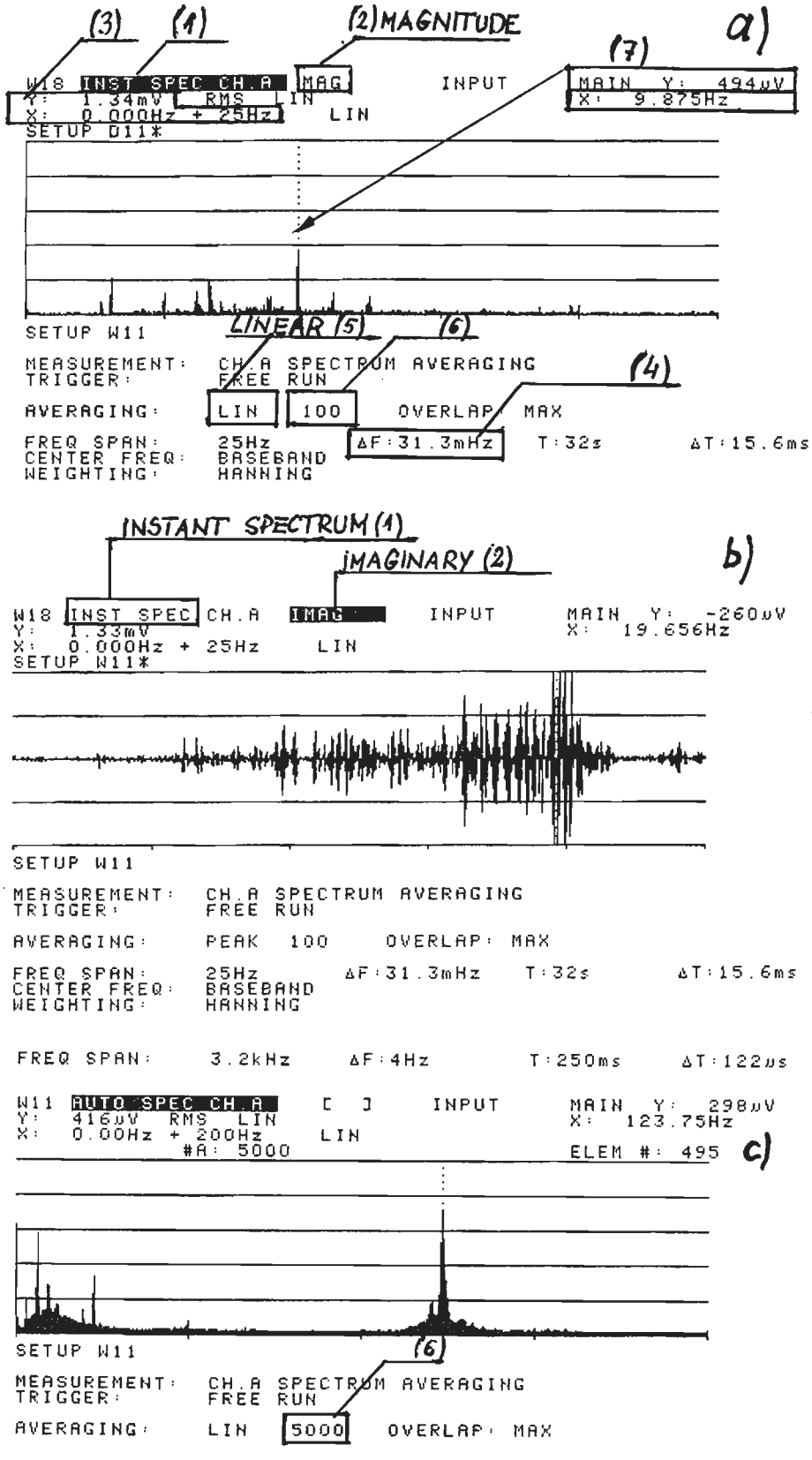


Fig. 4.5 a,b Results of Fourier analysis of vibrations from Fig. 4.4 using digital analyser,

c Result of Fourier analysis - averaging procedure for time interval 310 s.

Computer treatment of the signal may be conducted due to several options pertaining to the vibration characteristics, averaging procedure or scope of analysis. Diagrams in Fig. 4.5 a,b are instant amplitudes of acceleration, what is indicated in 'window(1)' - INSTANT SPECTRUM. The vibration characteristics being analysed are shown in 'window(2)'. These are amplitudes - MAGNITUDE, or real and imaginary part (REAL, IMAG) of acceleration function expressed in terms of complex variable.
The maximal ranges for X-axis (frequency in Hz) and Y-axis (acceleration in μV or mV) are given in 'window(3)'. Electrical signal multiplied by the factor from the calibration curve gives the real value of the signal. Calibration curve for digital type recorder is outlined in Fig. 4.6.

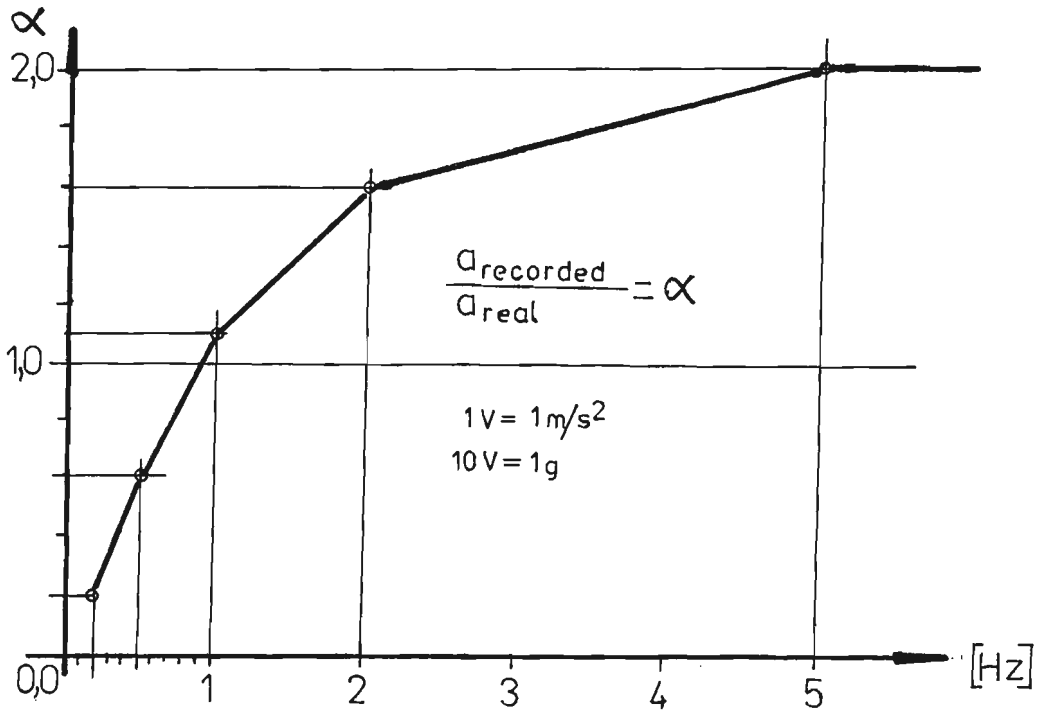


Fig. 4.6. Calibration curve for digital type recorder TCD-D10.

It can be seen, that for value A = 494 μV (Fig. 4.5a), A_{real} = 247 μV what is $2.47.10^{-5}$g. 'Window(4)' shows the frequency elementary division for discrete Fourier analysis and 'window(5)' shows the method of data averaging procedure (LINEAR). There is also a possibility to calculate the mean values of the amplitudes for a given time span. In this case the option 'AUTO SPECTRUM" should be switched on in 'window(1)' and the number of time intersections should be given in 'window(6)' (5000 lines is 310 s).

You may also notice a dotted-line indicator on every diagram. Coordinates of this point appear in 'window(7)'.
One important disadventage, connected with digital data analysis process should be revealed. The total magnitude of an individual input signal, recorded on digital type-recorder, does not give the same image after digital analysis has been performed. Due to discretization procedure and technical parameters of the analyser itself, an output signal is decomposed into several parts. Their total amplitude is the same as for input signal. The practical conclusion coming from this fact is, that in the case of the peak output signal (on the screen of the digital analyser) with some minor peaks being placed in its very proximity, they should be added together to form one value. The frequency for the final amplitude may be taken arbitrary from the span limited by two basic frequency divisions.
Thus in some cases, the upper limit for total output peak value may be calculated as the peak value from the analyser multiplied by factor three.

4.3. Discussion of the results

Assuming highly irregular vibrations spectra it has been reasonable to involve Fourier analysis of vibrations in data acquisition process.
The results are put together in Table 4.1. Along with the frequencies decomposition and accelerations, the location of measurement point, direction of acceleration, mode of Fourier analysis and time of recording are given. The procedure for the evaluation of acceleration maxima is outlined step-by-step in Fig. 4.7. (see next page).

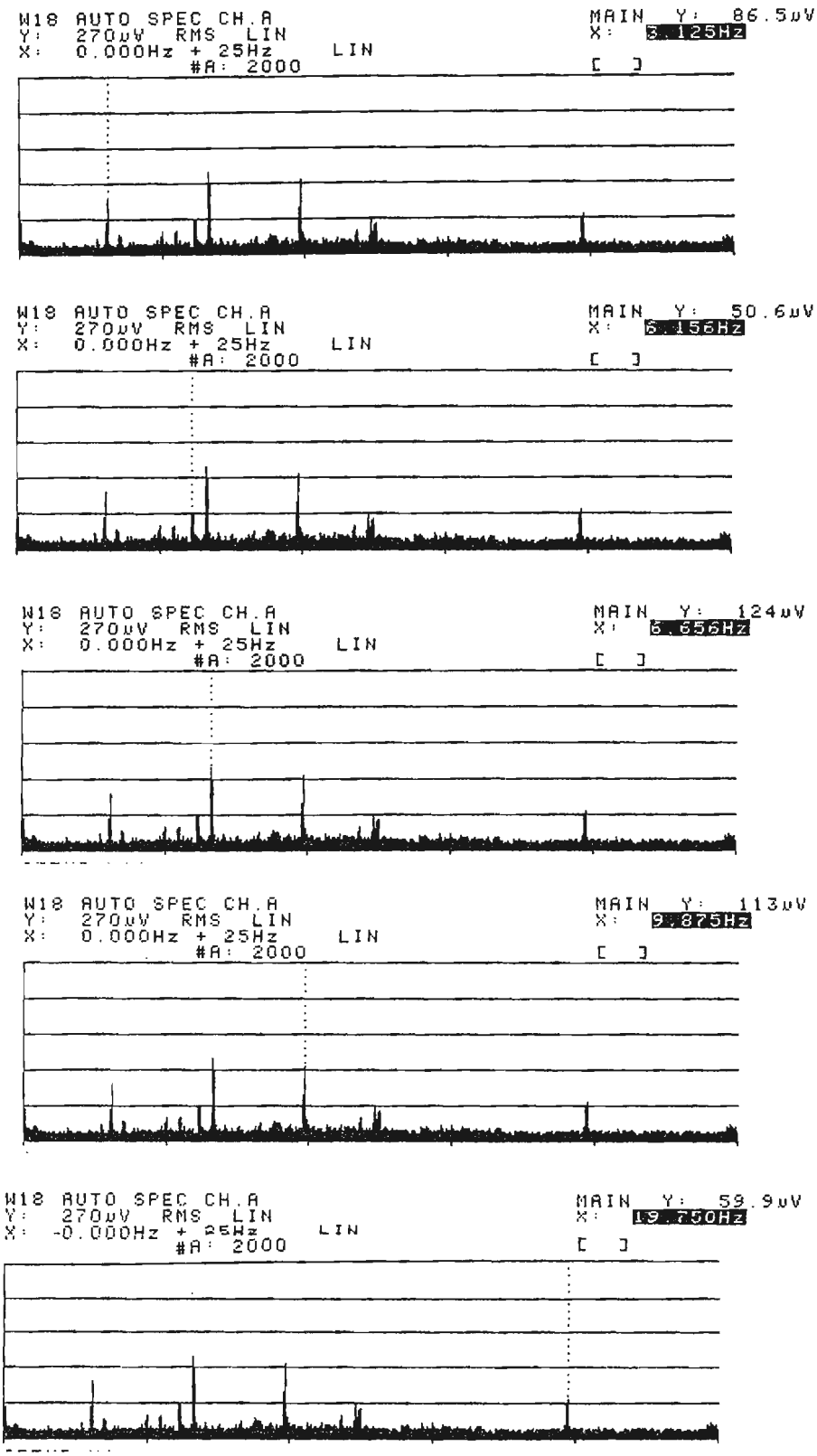


Fig. 4.7. Step-by-step procedure for the evaluation of acceleration maxima.

All acceleration spectra connected to the consecutive numbers from column 1 of Table 4.1 are given in Appendix 3.

Experimental data analysis revealed the small values of the accelerations measured on structural elements (points C,D).

Their maximal amplitudes are not higher than $2{,}1.10^{-5}g$ (0.00021 m/s^2) in the horizontal plane (X,Z) and $5{,}9.10^{-5}g$ (0.00059 m/s^2) vertically (Y). The differences between X and Z directions are not pronounced. It may be explained by high geometrical attenuation of ground waves due to the distance from the source of vibrations (51 m), as well as material damping. Important factor, influencing the values of acceleration is high spatial stiffness of the building.

The accelerations measurerd on concrete pedestal (A) attain similar values. Again, the main reason for it is big attenuation of Rayleigh waves by stiff concrete pavement and road-slab, covering the surface of the ground. In this case, the maximum of acceleration amplitudes is shifted towards high frequencies - for 124 Hz a = 0.000759 m/s^2.

The most valuable results come from point B. The eigenfrequencies of concrete fence-column, embeded directly into the ground are: for longitudial vibrations f_1 = 102 Hz, and for lateral vibrations f_2 = 1,6 Hz and f_3 = 2,4 Hz, what araises from cross-section rectangularity ($I_x \neq I_z$). These frequencies are not in resonance with any maxima recorded, so they do not disturbe the vibrations spectrum transmitted through the ground.

The maximal values of acceleration amplitudes are in accordance with the directions of Rayleigh waves propagation (Y,X) and reach 0.0055 m/s^2 for frequency span 19-20 Hz. Watching frequency spans more closely, one may deduce, that almost all maxima are the multiples of some basic frequency about 3,1 Hz and further 6,2 Hz; 9,3 Hz; 12,4 Hz; 18,6 Hz. The basic value of 3,1 Hz equals approximately the double value of eigenfrequency for the structure $f_e \approx 1{,}55$ Hz. Assuming the most unfavorable conditions, admissible according to experimental data, which can affect the construction, one may create following loading spectrum:

f_1 = 3,1 Hz ; a_1 = 0.0004 m/s^2
f_2 = 6,2 Hz ; a_2 = 0.00054 m/s^2
f_3 = 9,3 Hz ; a_3 = 0.000924 m/s^2

f_4 = 12,4 Hz ; a_4 = 0,00124 m/s^2
f_5 = 15,5 Hz ; a_5 = 0,002 m/s^2
f_6 = 18,6 Hz ; a_6 = 0,0054 m/s^2

Above accelerations are rather upper-limit values, for the real scale attenuation of ground waves has not been included and maximal recorded accelerations have been assumed as representative for given frequencies.

1	2	3	4	5	6													
no.	location of measure-ment point	direction of measure-ment	mode of Fourier analysis	time of re-cording	$m/s^2 \times 10^{-4}$ for frequencies in Hz													
					3.12 Hz	5.16	5.56	6.20	6.67	7.84	8.78	9.75	10.00	12.20	13.18	17.60	19.72	23.00	124.00	1400
1	A	Z	auto spectrum 310 sec	14-22-00	1,56			1,38				0,46		0,41						
2	A	Z	auto spectrum 310 sec	14-34-00	1,26			1,14	3,46			1,43								
3	A	Z	"	14-34-10															7,59	5,00
4	A	Z	"	14-34-10	0,74			1,50	3,51			1,64						2,00	5,20	
5	B	X	"	19-10-05	2,05			3,27	3,85		3,64			6,33	8,44	17,3	33,6			
6	B	X	"	19-19-38	1.71						9.40		16,20			20.10	34.60			
7	B	X	instant spectrum	18-50-05	2,32			3,75	3,80			2,70					13,20			
8	B	X	"	18-57-10	2,30			3,80	3,90			5,62				15,10	23,50			
9	B	X	"	18-56-00	1,56				1,42				2,50	1,24			10,40			
10	B	Z	"	19-59-15	4,05	2,34		2,51	3,99			7,41								
11	B	Y	"	20-05-20	2.85			3,05	2,11								24,90			
12	B	Y	"	20-07-00	2,20								9,00	11,70			51,50			
13	B	Y	"	20-09-05							12,7						21,90			
14	B	Y	"	20-31-05	3,60			3,00	3,60					7,50			33,60			
15	B	Y	auto spectrum 310 sec	20-22-11	3,10		2,11	3,09				6,49	10,4				54,30			
16	B	Y	"	20-27-10	3,09		2,04	4,21			17,4			8,83			44,00			
17	B	Z	"	19-38-56	4,18	2,74		5,44	4,42			6,16				4,71	2,44			
18	B	Z	"	19-44-25	4,02	3,48		5,32	4,45			9,24		12,40	9,81	9,00	7,12			
19	C	Y	"	20-44-40	4,40	4,65	1,84	2,47		5,90										
20	D	X	instant spectrum	12-25-00	1,38			0,54	2,01			0,94		0,67			0,68			
21	D	X	auto spectrum 310 sec	12-35-30	1,32				1,81			1,18								
22	D	Z	"	13-41-30	1,57			0,73	0,80											
23	D	Z	"	13-48-00	1,14				1,80			1,13								
24	D	Z	"	12-11-45	1,65			1,21	0.81											

Table 4.1. Results of Fourier analysis of traffic induced vibrations.

5. Experimental analysis of the vibrations generated by crane

5.1. Experimental program

Site measurements of crane induced vibrations were performed during different phases of cran's operation. The crane was exactly the same like the one which was used for the assembling of prestressed concrete floor-slabs. Its total mass (with counterweight) was about 130 t. While working, the crane is additionally stabilized by four steel supports carrying all its weight. Experimental set-up was identical with the equipment used for measurements of traffic induced vibrations. The crane was assembled in the neighbourhood of one-storey building with stiff ground floor and continuous foundations on the ground piles. The distance from the laboratory building was about 30 m. The accelerometer was fixed to a concrete block (0,10 x 0,20 x 0,30 m) embeded 0,10 m into the ground (point A), and to the uncovered crest of a pile foundation (point B). Accelerations were recorded in the directions of Rayleigh waves propagation (X,Y) on 23rd of March 1992. The location of the points of measurement is shown in Fig. 5.1 (see next page).

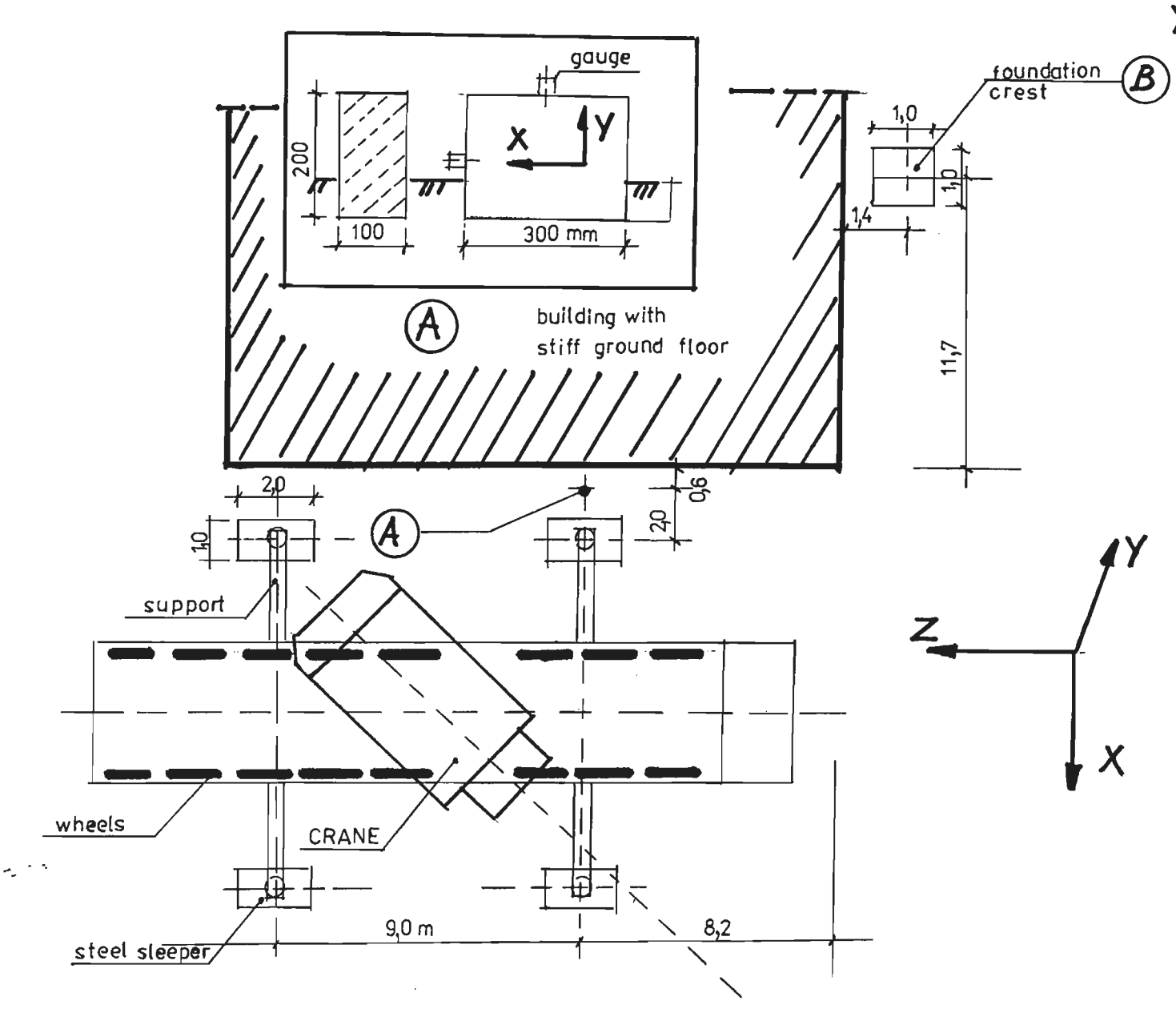


Fig. 5.1. Location of measurement points.

5.2. Results of measurements

The ground and foundation crest accelerations were monitored during different phases of the crane's activity. To make easier the comparison of results, those phases are listed in Table 5.1. with particular time intervals, related to measurement points.

Table 5.1. Start points of the time invervals for particular crane's activity.

Type of crane's activity	Point A Direction X	Point A Direction Y	Point B Direction X	Point A Direction X
(1) Start	8-58-51	9-15-02	9-33-30	
(2) Stationary running	8-59-00	9-16-39	9-34-04	
(3) Increased speed of engine	8-59-49	9-17-11	9-35-11	
(4) Cable goes up	9-00-16	9-17-50	9-35-45	
(5) Cable goes down	9-11-53	9-18-43	9-36-44	
(6) Arm goes downward	9-02-49	9-19-20	9-37-30	
(7) Arm goes upward	9-03-34	9-20-18	9-38-15	
(8) Crane turns around	9-04-39	9-21-46	9-39-21	
(9) Segment of the arm goes onward	9-06-55	9-23-21	9-40-40	
(10) Segment of the arm goes backward	9-08-10	9-25-00	9-42-10	
(11) End	9-09-26	9-26-14		
(12) Crane's disassembling Phases of crane's disassembling include additionally: - pulling backward steel horizontal supports, - lifting up vertical, hydraulic supports, - dismanteling the counterweight, - turning on second engine, - hoisting the sleepers from under the steel supports.				from 10-14-00 to 10-42-00

The records of acceleration are this time more regular than for traffic induced vibrations. For they may be often considered as periodic vibrations, it was reasonable to acquire values of amplitudes and frequencies directly from the oscilloscope.

Thereafter it is possible to evaluate their mean values, which are the basis for the creation of loading histories. Some direct records of acceleration which may be considered as representative, are shown in Fig. 5.2. The average characteristics of vibration are given in Table 5.2.

Table 5.2. Average charactersitics of vibrations from Fig. 5.2.

	Time of recording (hours-minutes-seconds)	Amplitude of accelerations [m/s^2]	Frequency [Hz]
a	9-02-25	0,0305	1,0759
b	9-09-20	0,024	1,0700
c	10-18-04	0,0454	1,1644
d	10-25-30	0,136	0,8293
e	10-38-40	0,0505	1,0638

The more complete set of data is presented in Appendix 4. Some important informations concerning the data in Appendix 4 are presented in Table 5.3.

The values of amplitude oscillate in very wide range, from 0,0370 to 0,225 m/s^2. They are 10 - 10^4 times higher than the values coming from road traffic. The frequencies of about 1 Hz, which are close to the eigenfrequency of the structure, may be spotted in many recordings, however the majority of vibrations is located in the frequency span 70 - 110 Hz.

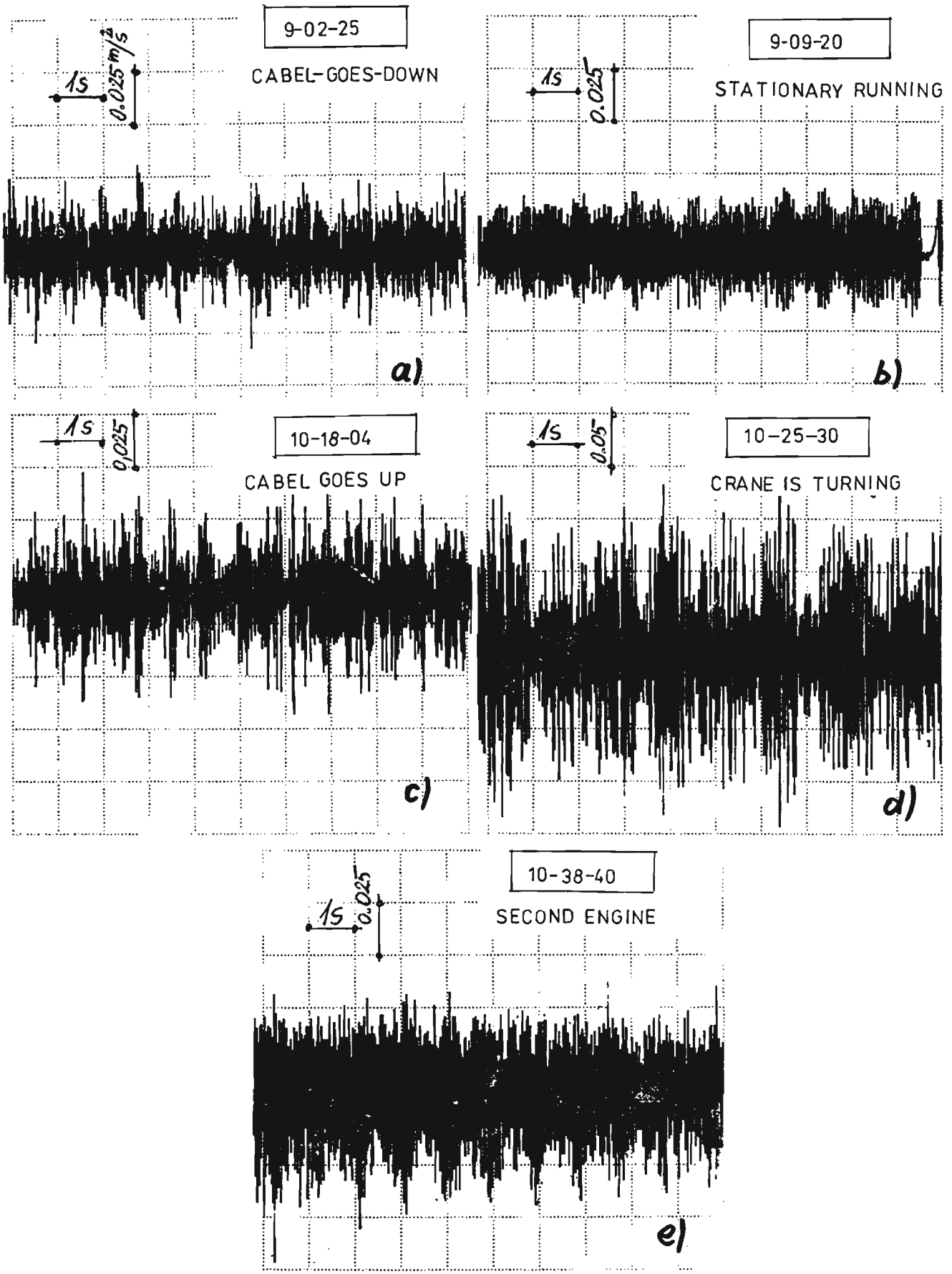


Fig. 5.2. Representative recordings of vibrations for different phases of crane's operation.

Table 5.3. Comparison of vibrations recorded at different time instants.

No.	Type of crane's activity	Point	Direction of measure-ment	Time of recording	Maximal amplitude of acceleration [m/s^2]
1	2	3	4	5	6
1.	Engine accelerates	A	X	10-15-30	0.0575
2.	Arm goes downward	A	X	10-16-20	0.0650
3.	Stationary running	A	X	10-17-40	0.0375
4.	Cable goes down	A	X	10-20-20	0.2000
5.	Second engine starts running	A	X	10-28-00	0.0875
6.	Hydraulic, vertical supports start moving	A	X	10-37-55	0.0500
7.	Segment of the arm goes backward	A	X	9-09-18	0.0375
8.	Crane turns around	A	X	9-06-48	0.2250
9.	Crane turns around	A	X	9-05-38	0.1825
10.	Segment of the arm goes onward	A	X	9-07-00	0.3050
11.	Arm goes downward	A	X	9-19-28	0.0375
12.	Crane turns around	A	X	9-22-05	0.0285
13.	Cable goes up	A	X	10-18-30	0.1600
14.	Crane starts turning	A	X	10-24-10	0.1125
15.	Increased speed of the second engine	A	X	10-28-20	0.1000
16.	Stationary running of the second engine	A	X	10-31-00	0.2250
17.	Hydraulic, vertical supports go up	A	X	10-38-10	0.0525
18.	Crane supported on wheels only	A	X	10-41-05	0.0370
19.	Stationary running	B	X	9-34-15	0.0040
20.	Cable goes down	B	X	9-36-10	0.0105
21.	Cable goes down	B	X	9-36-45	0.0325
22.	Arm goes downward	B	X	9-38-00	0.0075
23.	Arm goes upward	B	X	9-39-02	0.0105
24.	Segment of the arm goes onward	B	X	9-40-54	0.0125

5.3. Fourier analysis of accelerations

The detailes of Fourier analysis have been elucidated earlier. That is the same scheme as in Chapter 4.2, used for the presentation of the results. Some AUTO-SPECTRA for 1000 and 2500 lines are presented in Fig. 5.3. Supplementary data are delivered in Table 5.4.

Table 5.4. Results of Fourier analysis of crane induced vibrations

No.	Location of measurement point	Direction of measurement	Time of recording	Mode of Fourier analysis	Acceleration in $m/s^2.10^{-4}$ for frequencies in Hz							
					3,125	6,67	7,84	12,20	237	84	91	124
1	2	3	4	5	6	7	8	8	9	11	12	13
1	A	X	9-00-30	Auto spectrum 62 s							1590	
2	A	X	9-03-20	-"-						3800		
3	A	X	9-05-10	-"-							1570	
4	A	X	9-17-55	Auto spectrum 155 s								92,55
5	B	X	9-38-00	-"-	2,26	2,72			2,70			
6	A	X	10-23-10	-"					52,0			
7	A	X	10-38-00	-"-	2,29		5,13	4,24				

There is an important observation, furnished by the examining of the above data. There are some very strong peaks of amplitude for frequencies of about 70 - 110 Hz. They reach values of 0,15 - 0,4 m/s^2, which are extremely high in comparison with the amplitudes have been recorded previously. This fact should be included in dynamic loadings for numerical analysis.

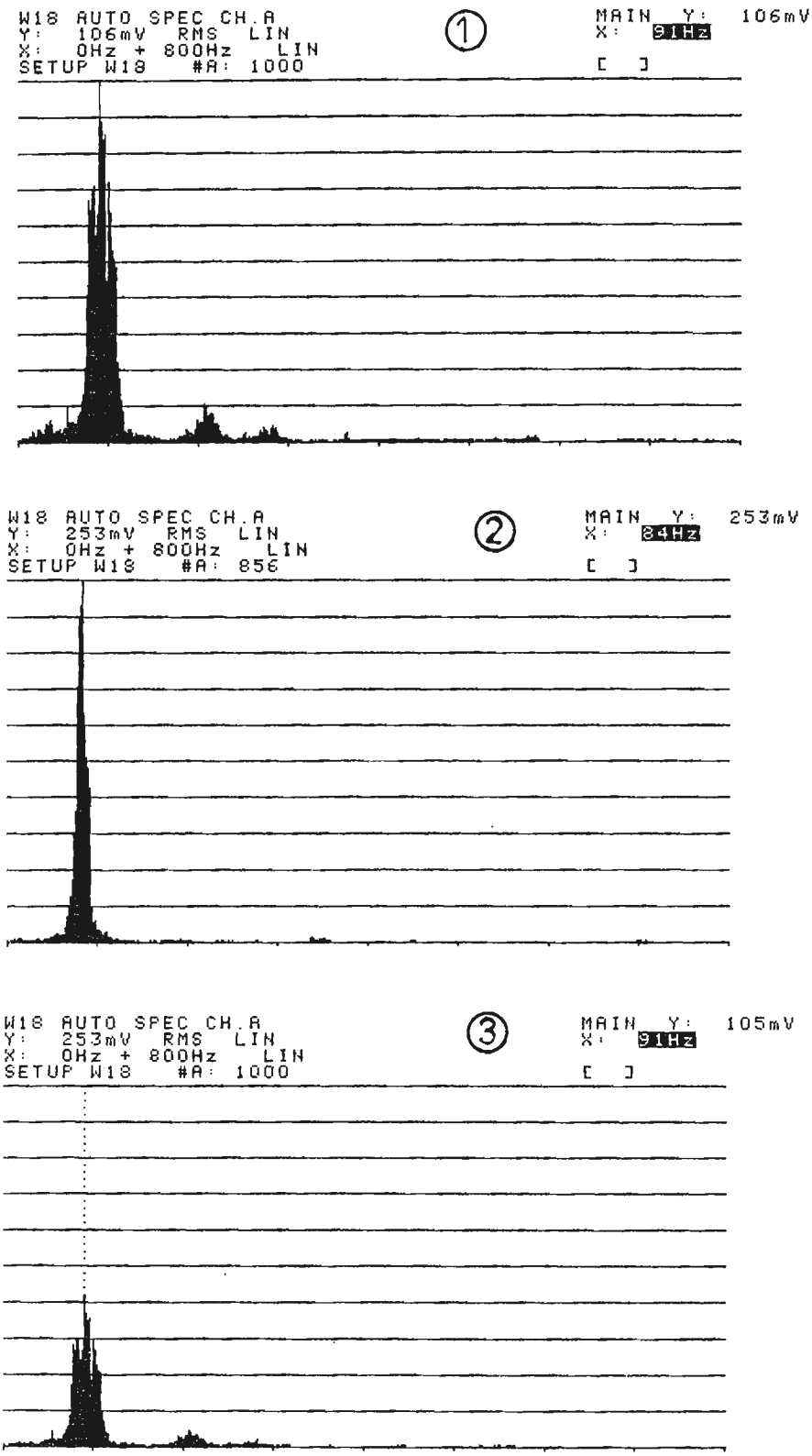


Fig. 5.3. Fouriers analysis of vibrations for parameters given in Tabel 5.4.

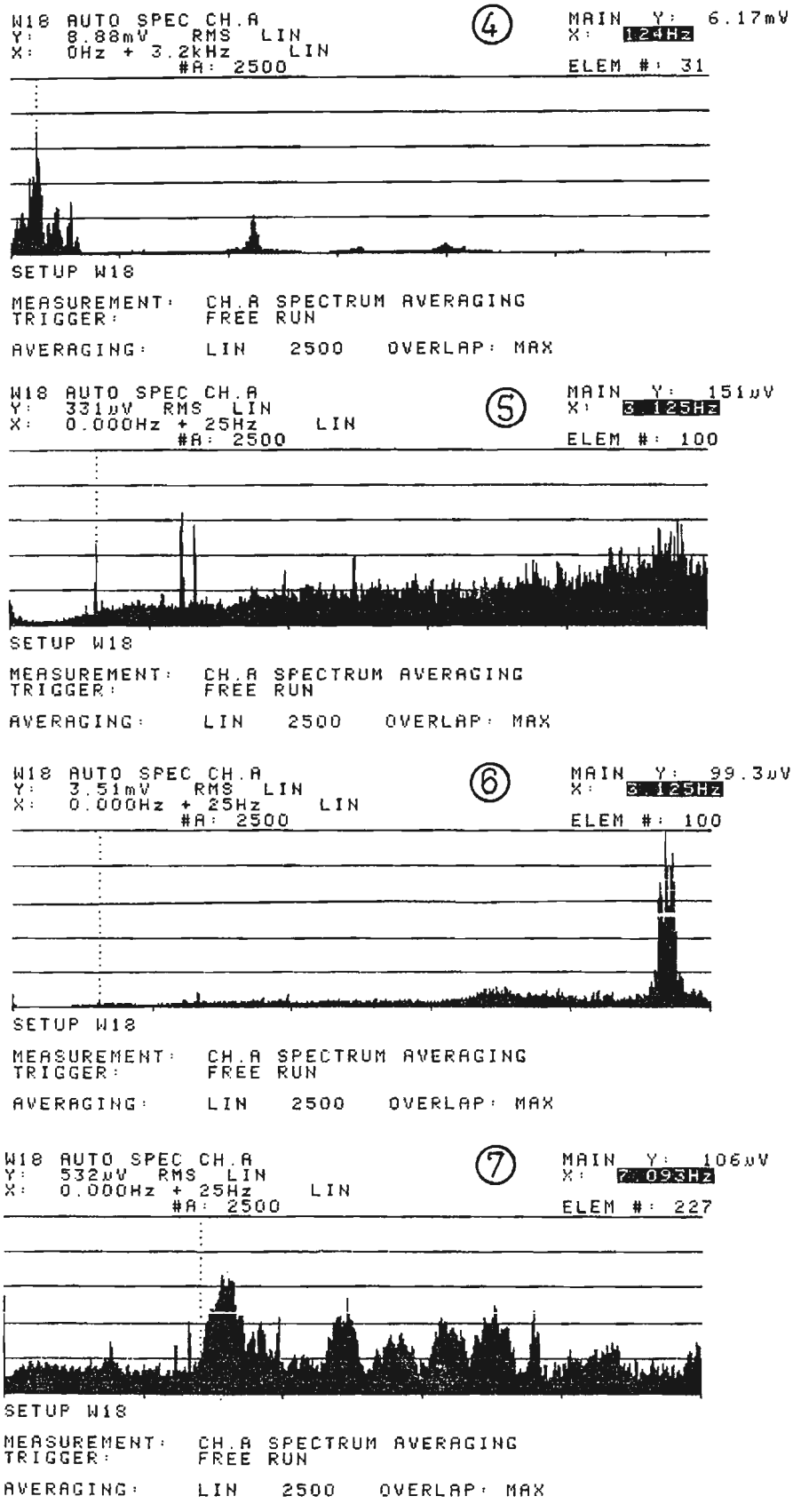


Fig. 5.3. Fouriers analysis of vibrations - continuation.

6. Numerical analysis

6.1. Dynamic analysis of structure - STRUDL system

The procedure for numerical analysis performed by STRUDL system is schematically outlined in Fig. 6.1. (see next page), as the path marked with the thick line on the flow-chart for dynamic analysis.
Dynamic calculations for mass-systems having many degrees of freedom are very time-consuming, even for relatively fast computers. Especially the modal analysis according to long-term loading histories, maybe the matter of many hours calculations. In order to deal with realistic and consistent dynamic scheme, with limited number of the dynamic degrees of freedom, it is recommended to perform same estimating calculation.
It can be done easily in the phase of eigenvalue analysis, which does not require much of the computation time.

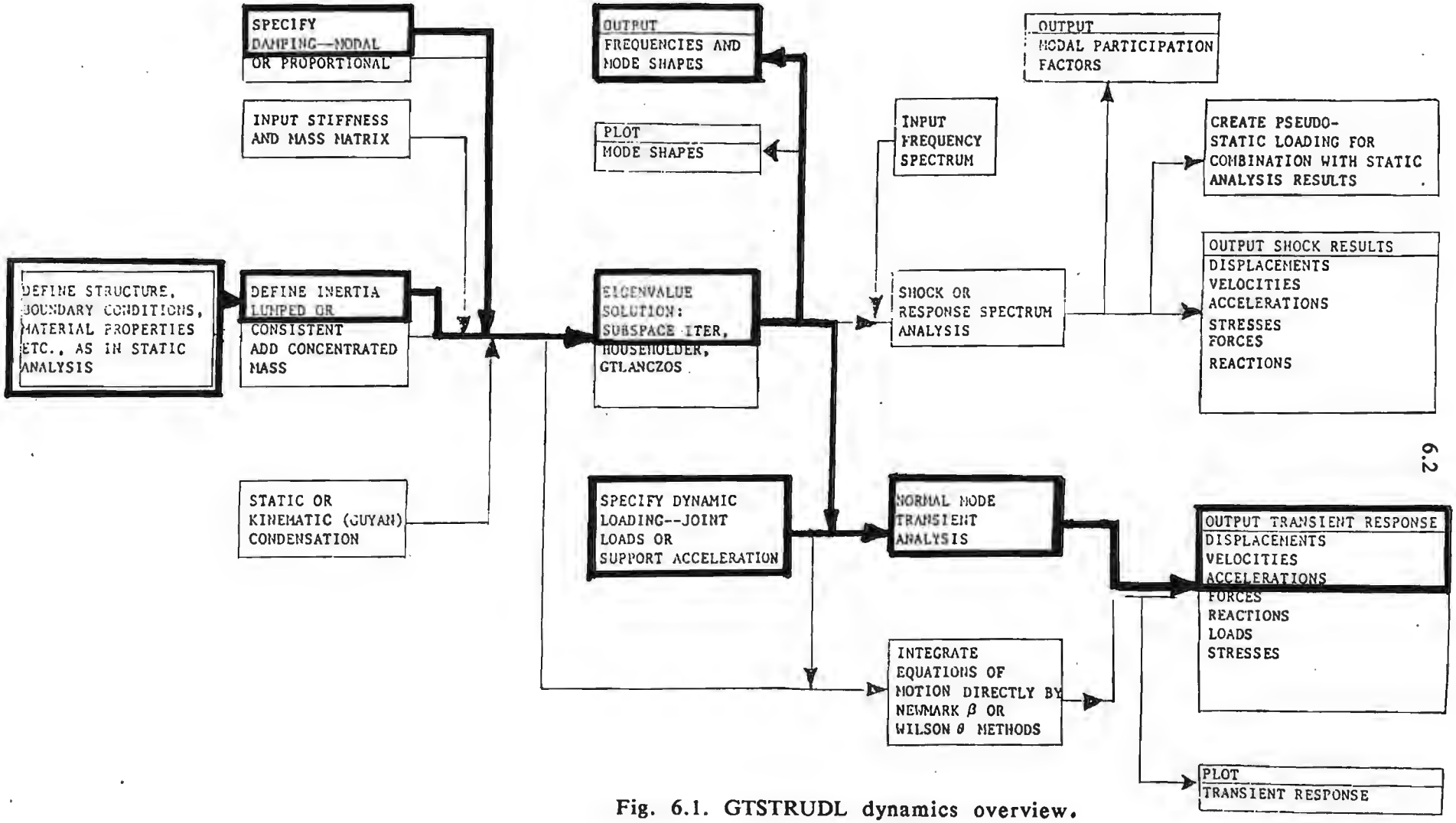


Fig. 6.1. GTSTRUDL dynamics overview.

6.2. Elastic constraints

The global stiffness of structure depends on several factors, such as: interelements connections, lateral stiffness of the foundation, 'the fixity factor' of the column-to-base connection and the external constraints provided by the rest of the building. Interelements connections were briefly described in Chapter 1.4.

To evaluate the lateral stiffness of the foundation, it was assumed that continuous foundation is submitted under vibrations transmitted through the ground layers. Foundation is restrained against lateral movements due to 'passive' and 'active' pressure of the ground. Corresponding values of pressures acting on a foundation are shown in Fig. 6.2.

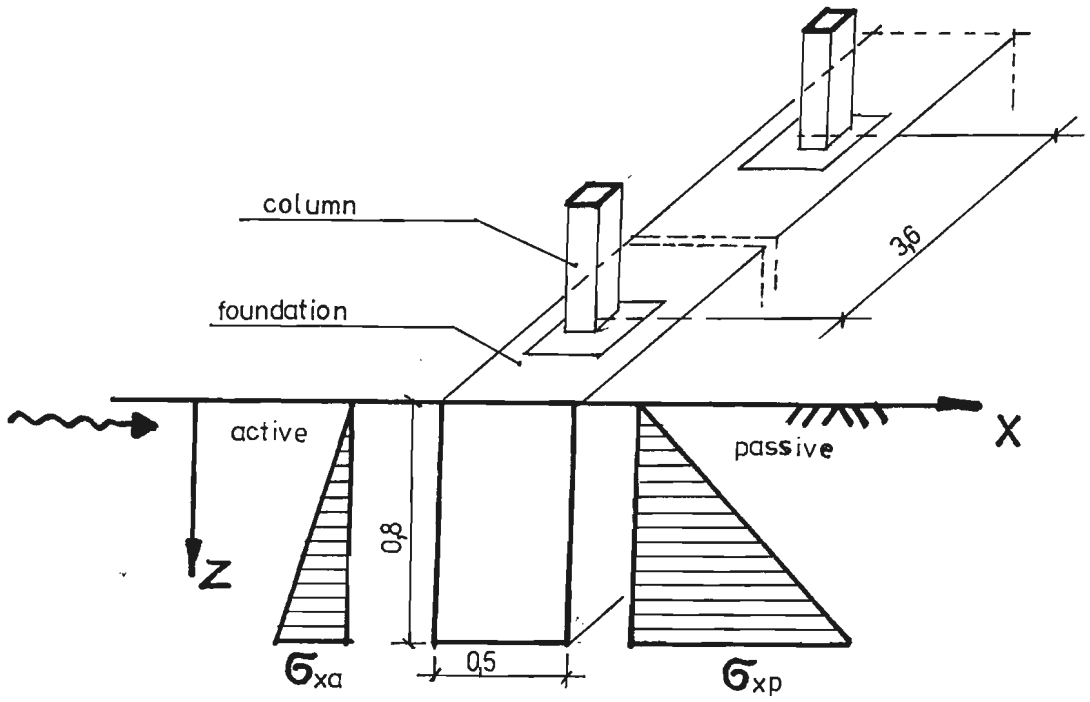


Fig. 6.2. 'Active' and 'passive' ground pressure.

The relative displacement between soil and construction foundation may cause the soil either to expand or to contract. In the first case, this develops an 'active' pressure, in the second a 'passive' pressure. Due to approximate values of ground characteristics the action of piles was overlooked. For average value of the angle of internal friction $\phi = 30^{\circ}$, the values of 'active' and 'passive' pressure are as follows:

$$k_a = tg^2 (45^\circ - 0{,}5\phi) = 0{,}333 \tag{6.1}$$

$$k_p = tg^2 (45^\circ + 0{,}5\phi) = 3{,}0 \tag{6.2}$$

$$\sigma_{xa} = k_a.z.\gamma = 4{,}80 \text{ kN/m}^2 \tag{6.3}$$

$$\sigma_{xp} = k_p.z.\gamma = 43{,}20 \text{ kN/m}^2 \tag{6.4}$$

The major problem now, is how to assume soil elastic spring constant K. It is a function of soil type, and of size and shape of the foundation. In preliminary calculations when reliable soil information is not available, it is often assumed to be function only of soil type. For weak soils K is from the range 4000-20 000 kN/m^3. It yields for horizontal direction:

$$K_x \approx 0{,}5 \text{ K} = 2000 - 10\ 000 \text{ kN/m}^3 \tag{6.5}$$

For the resultant average pressure:

$$\Delta\sigma = (\sigma_{xp} - \sigma_{xa}) \cdot 0{,}5 = 19{,}2 \text{ kN/m}^2 \tag{6.6}$$

the displacement of the foundation is $\delta = 1{,}92.10^{-3} - 9{,}6.10^{-3}$m and henceforth the lateral stiffness of the foundation may be assumed as:

$$K_f = \Delta\sigma.\ell.h/\delta = 2{,}88.10^7 - 5{,}76.10^6 \text{ N/m} \tag{6.7}$$

The average value of $K_f = 1.15.10^7$ N/m is assumed in numerical calculation. It is for all columns, except the ones located in the corners, where lateral displacement is prevented by vertical continuous foundations. Constraints provided by the rest of the structure are due to the lateral stiffness of columns standing in row, with their upper ends braced by girders. If the number of columns is greater than three, the stiffness of successive three elements only is taken into account.
The characteristics of elastic constraints evaluated according to the above rule are given below, with the designations according to Fig. 6.3 and Fig. 6.4.

$K_1 = 3{,}2574.10^6$ N/m

$K_2 = 7{,}02822.10^5$ N/m

$K_3 = 2{,}1247.10^6$ N/m

$K_4 = 7{,}082.10^5$ N/m

$K_5 = 7{,}082.10^5$ N/m

$K_6 = 1{,}1122.10^5$ N/m

$K_7 = 1{,}1122.10^5$ N/m

6.3. Discretization of structure

The location of the global coordinate system and the numberation for nodes and elements are shown in Fig. 6.3. and Fig. 6.4. (see next two pages).

To evaluate the influence of some structure parameters on dynamic behaviour of the building, the values of eigenfrequencies were calculated for different schemes.

The parameters given below are assumed as the initial values, which may vary in subsequent steps:

a) connection between concrete slab and steel girder: pinned joint with lateral movement prevented,
b) 'beam-to-column' connection: fixed joint,
c) 'column-to-basement' connection: rotational spring constant $K_M = 1{,}0.10^9$ N/m,
d) number of dynamic degrees of freedom equals number of the static degrees of freedom.

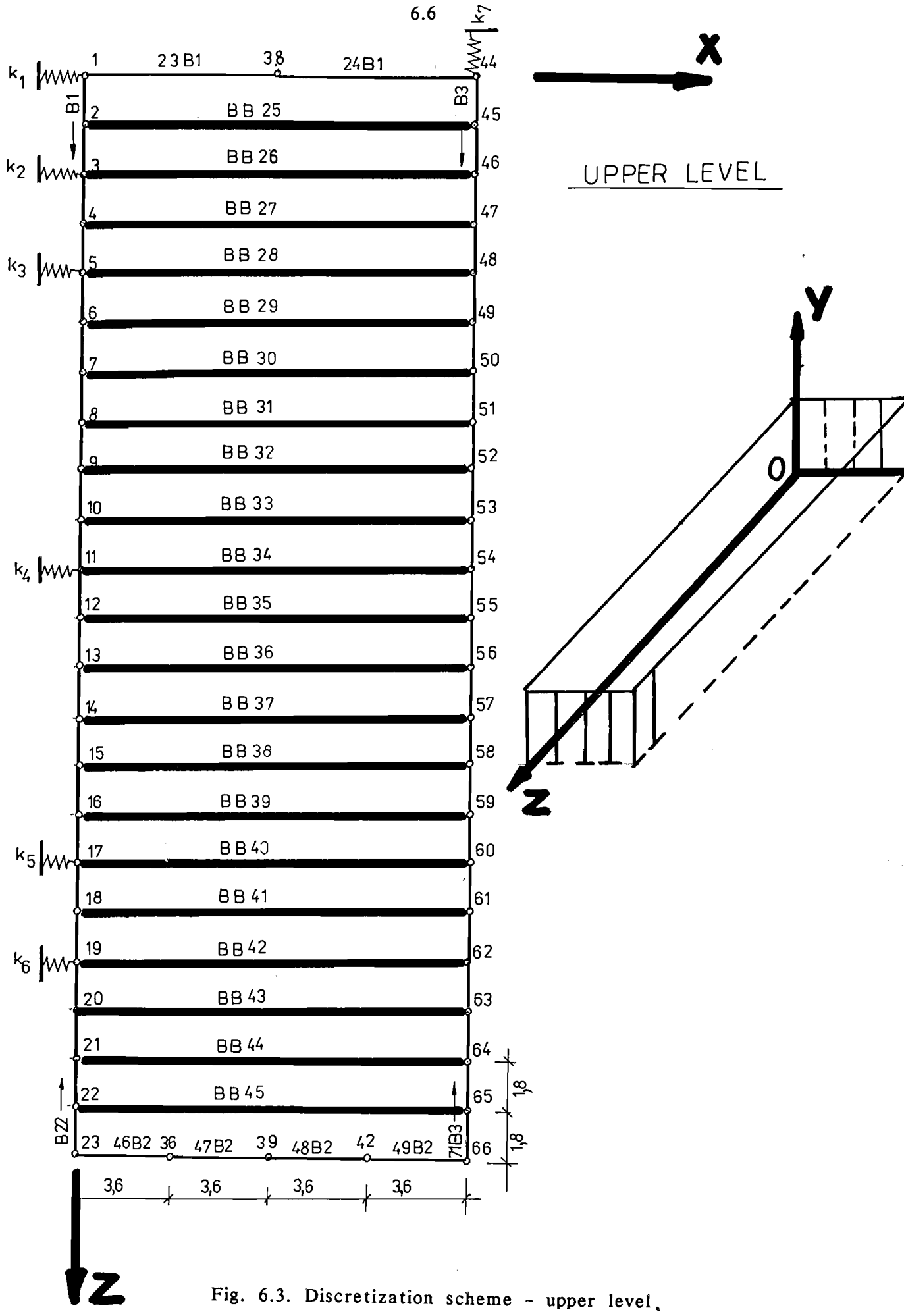


Fig. 6.3. Discretization scheme - upper level.

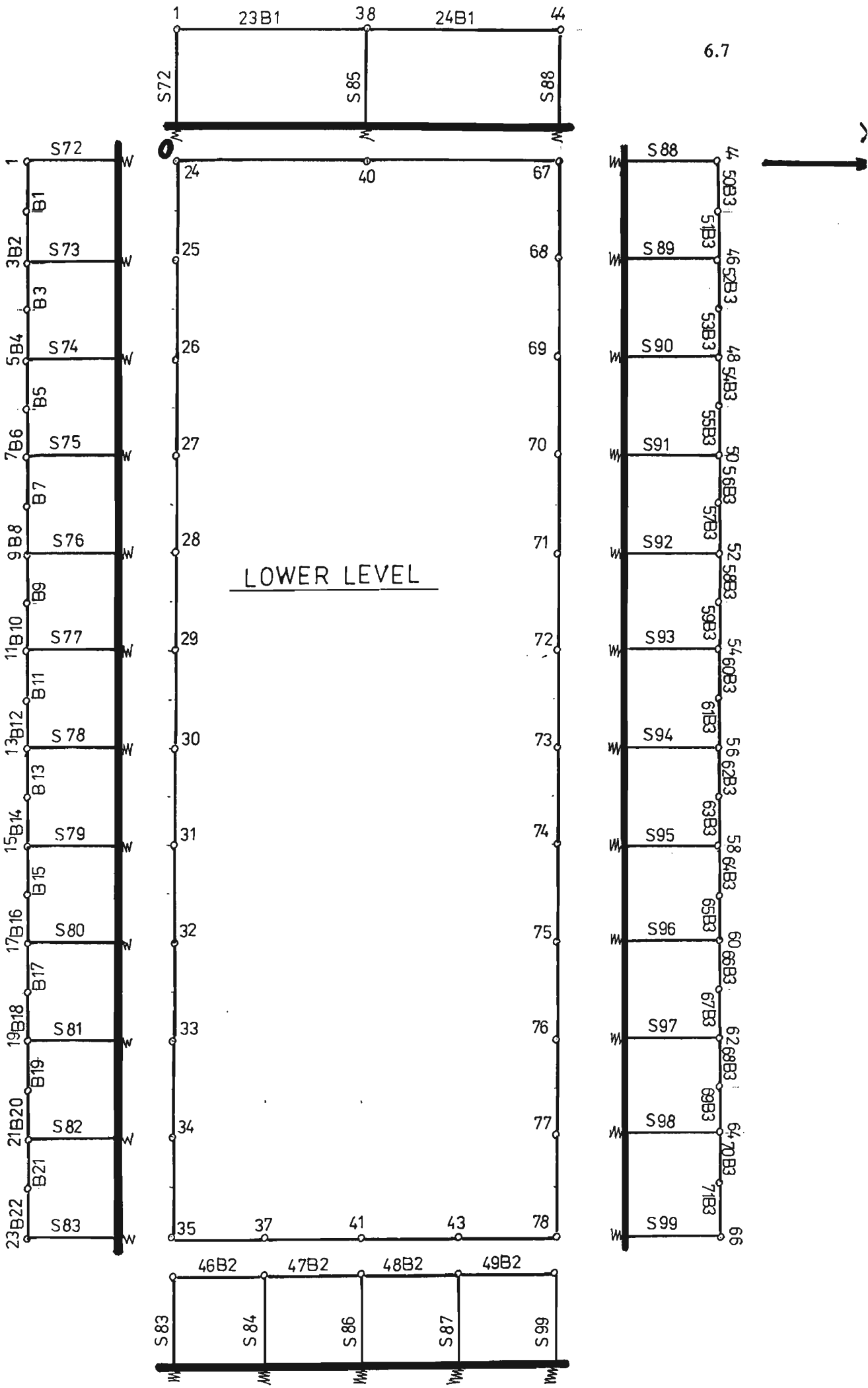


Fig. 6.4. Discretization scheme - lower level.

Since the size of the stiffness matrix depends on the number of dynamic degrees of freedom their number was the first parameter submitted under investigation. In STRUDL system, there exists an automatic procedure, which evaluates the number of dynamic degrees of freedom according to the lowest K/m, where K is a translational or rotational stiffness term on the diagonal of the structure global stiffness matrix, and m is the corresponding translational inertia or rotational inertia term on the diagonal of the structure mass matrix.
The eigenvibration frequency was calculated for different numbers of the dynamic degrees of freedom. Results are as follows:

- number of the dynamic degrees of freedom equals number of the static degrees of freedom (380): eigenfrequency f = 1,28 Hz,
- 100 dynamic degrees of freedom for translation X,Z and rotation Z: f = 1,32 Hz,
- 100 dynamic degrees of freedom for translation X,Z: f = 1,26 Hz,
- 70 dynamic degrees of freedom for translation X: f = 1,305 Hz

It may be noticed, that the last number (70) is quite satisfactory and gives correct dynamic characteristics of the structure.
In a similar way, the influence of the rotational stiffness of 'column-to-basement' connection on the eigenfrequency of the structure was examined. Calculations were performed for different values of rotational spring constant K_M, while the rest of parameters had been kept unchanged. It is possible to plot the characteristic curve: rotational stiffness K_M vs. period of eigenvibrations T, what is shown in Fig. 6.5.

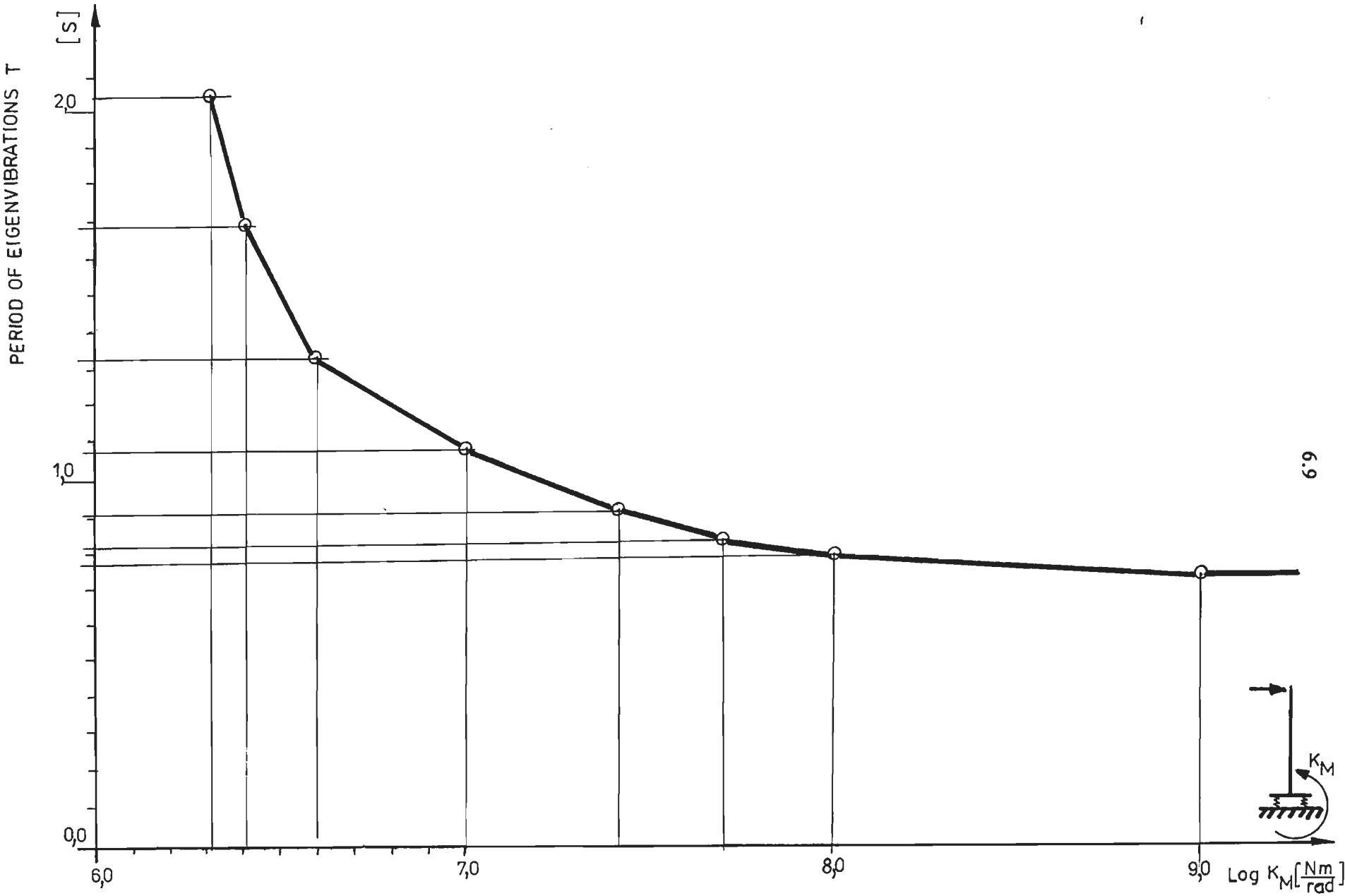


Fig. 6.5 Rotational stiffness of the support K_M vs. period of eigenvibrations T.

One may observe, that due to different rotational characteristics of column-to-base joint, the period of eigenvibrations changes from 0,7-1,5 s. For another kind of joints (column-to-beam), two values of eigenfrequencies were evaluated:

- for beam-column joints fixed: f = 1,305 Hz
- for beam-column joints hinged: F = 1,300 Hz

Since the stiffness of beam-column joint is of no importance this type of connections is assumed as 'fixed' in subsequent analysis.

Finally, supports of prestressed-concrete slabs were analysed. They can be 'pinned' in the three directions, with the longitudial movement on both supports prevented, or on the contrary, the displacement along a slab span can be admitted on one of the supports. The frequencies for both cases are given below:

- displacement along a slab span prevented: f = 1,305 Hz
- free sliding along a span on one of the supports: f = 1,43 Hz

Also in this case, eventual release of one of the lateral constraints does not change a lot (9,5%) the dynamic characteristics of the structure. The floor-slab supports with both lateral constraints present are default values henceforth.

6.4. Dynamic loadings

As the results of considerations presented in previous chapters, three basic dynamic loadings were included in numerical calculations: crane vibrations, traffic vibrations and wind loading. All data applied for creating dynamic loadings entailed by crane and traffic were the values estimated empirically. The wind loading is purely hypothetical, since it is not possible to reconstruct the real atmospheric conditions now.

Traffic induced vibrations

Following maximal amplitudes and frequencies furnished by Fourier analysis of vibrations coming from road-traffic, it was concluded, that almost all maxima are the multiples of some basic frequency 3,1 Hz, and further 6,2; 3,3; 12,4; 15,5; 18,6 Hz. The basic value 3,1 Hz equals approximately the double value of structure eigenfrequency f_e = 1,31 Hz, assumed as default frequency in numerical calculations.

To be able to compare the results for different dynamic loadings, structure geometry and stiffness characteristics had been kept deliberately unchanged, while loading frequencies were slightly modified. Parameters of the loading spectrum for traffic vibrations are given in Table 6.1.

Table 6.1. Characteristics of the loading spectrum for traffic vibrations

Multiple of f_e f_e = 1.131 Hz	Frequency f [Hz]	Amplitude a_o [m/s^2] x 10^{-4}
2	2.62	4.000
4	5.24	5.400
6	7.86	9.2400
8	10.48	12.400
10	13.10	20.000
12	15.72	54.000

Accelerations were implemented in the form of sine function into computer program:

$$a(t) = a_o \sin (2\pi f t + \phi) \qquad (6.8)$$

All supports are supposed to have identical acceleration according to equation (6.8). The ultimate value of acceleration is the sum of accelerations evaluated for each frequency. The resulting motion of the structure joints is relative to the supports.

Crane induced vibrations

Ground accelerations measured in the proximity of structure, are supposed to coincide with supports accelerations. Every loading history expressed in the form of supports acceleration should be transformed into response spectrum, sine (cosine) function or loading history given point-by-point in time-acceleration Cartesian coordinate system.
Since the amplitudes and frequencies vary in time during crane operation, the only practical solution is to apply trigonometric function.

Experimental data file is composed of the recordings of the two types. These are the recordings obtained directly from oscilloscope and recordings coming from Fourier analysis. A great part of vibrations presented in Appendix 4, is the result of the interference of some harmonic vibrations. Very often, only two harmonic components dominate in the vibration spectrum and so-called 'beating phenomenon' may be clearly observed. When two harmonic accelerations of slightly different frequency are superimposed, a nonharmonic acceleration occurs, as shown in Fig. 6.6. It appears to be harmonic except for a gradual increase and decrease in amplitude. For such a condition the expression for acceleration may be written as a sum of two harmonic components:

$$a(t) = a_1 \sin(\omega_1 t + \phi_1) + a_2 \sin(\omega_2 t + \phi_2) \tag{6.9}$$

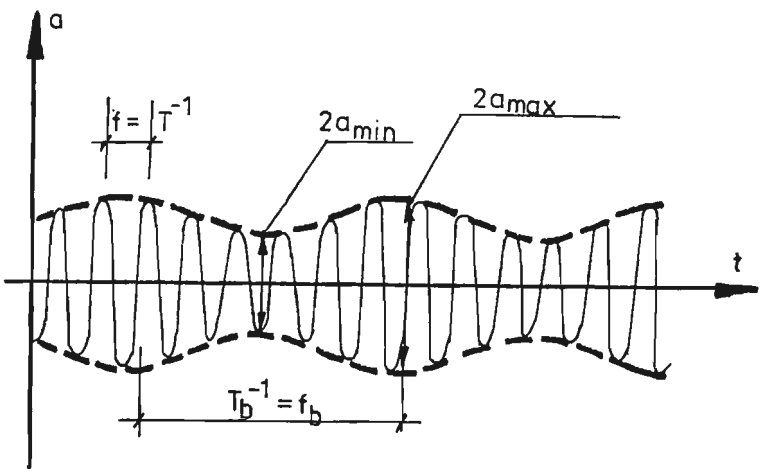


Fig. 6.6. Acceleration containing a beat.

The dashed curve representing the envelope of the vibration amplitudes oscillates at a frequency, called the 'beat frequency', which corresponds to the difference in the two source frequencies:

$$f_b = \frac{|\omega_1 - \omega_2|}{2\pi} \tag{6.10}$$

The frequency of the combined oscillations is the average of the frequencies of the two components and is given by:

$$f = \frac{\omega_1 + \omega_2}{4\pi} \tag{6.11}$$

The maximum and minimum amplitudes of acceleration are the sum and difference respectively of the amplitudes of the two sources:

$$a_{max} = a_1 + a_2 \tag{6.12}$$

$$a_{min} = |a_1 - a_2| \tag{6.13}$$

Applying above rules to the accelerations from Fig. 5.2, every vibration can be decomposed into two basic harmonic equations. Fourier analysis reveales, that the strongest amplitudes are located in frequency span 70-110 Hz. Assuming the 'beat frequency' to be the same as the eigenfrequency of the structure (f_e = 1.305 Hz), which is quite close to frequencies from Table 5.2, we may write the equation of acceleration as a sum of the two harmonic vibrations.
It is outlined in detail for the acceleration spectrum from Fig. 5.2d, having relatively big amplitude:

$a_{max} = 0.136\ m/s^2$
$a_{min} = 0.035\ m/s^2$
$\omega_1 = 79.605$ Hz
$\omega_2 = 78.300$ Hz
$a_1 = 0.0855\ m/s^2$
$a_2 = 0.0505\ m/s^2$

$$a(t) = 0.0855 \sin(500.32t) + 0.0505 \sin(492.12t) \tag{6.14}$$

Phase angle is assumed as $\phi = 0.0$, but evidently may attain any value from the range $0\text{-}2\pi$.
Another kind of dynamic loading is the curve created on the basis of Fourier analysis. As it was already mentioned, characteristic frequency span is 70-100 Hz. A very high amplitude (0,15-0,4 m/s^2) are correlated with accelerations having those frequencies.

A typical acceleration may be represented by the equation:

$$\omega = 63.f_e = 82{,}24 \text{ Hz}$$

$$a = 0{,}38 \sin 63.f_e.2\pi.t = 0{,}38 \sin (516{,}73t) \qquad (6.15)$$

Wind loading

It is hardly possible to create the real 'wind loading history' without experimental data. A simple wind spectrum is proposed in Fig. 6.7.

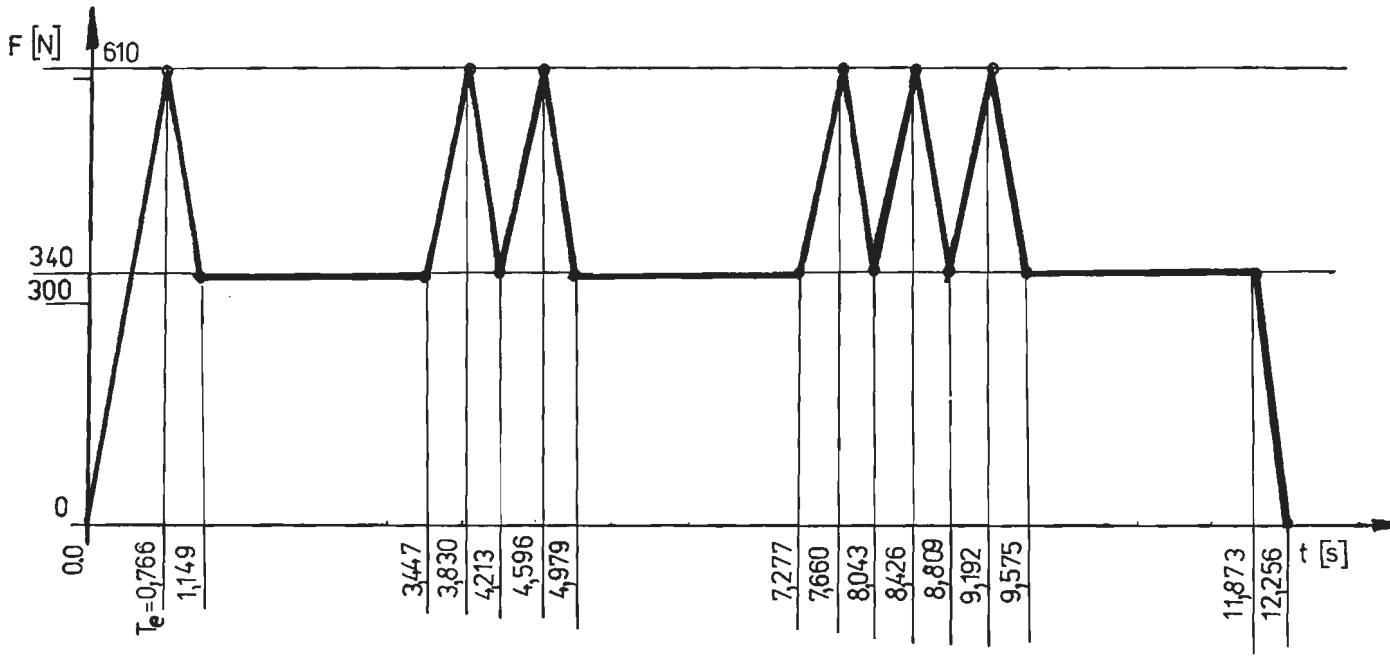


Fig. 6.7. Wind loading history.

The pressure of wind velocity was evaluated in Chapter 1.3.1. and equals $p = 0.21$ kN/m^2. It is an average value recommended in CEB Code [9]. The value of gust factor is taken as $\beta = 1.8$, what yields peak quasi-static pressure $\overline{q}_{max} = 0{,}378$ kN/m^2. This pressure acts on lateral sides of slabs, beams and columns.

Frequency of gusts equals the frequency f_e.

6.5. Results of numerical calculations

Numerical calculations have been performed for loading histories outlined in details in Chapter 6.4. Since we are dealing with frequencies, which are close to resonance frequency, damping ratio has to be implemented in every dynamic calculation. Damping is specified in STRUDL in two ways depending on wheather a modal superposition or direct integration transient analysis is to be performed.

In a modal analysis, applied herein, percent damping should be specified. According to CEB recommendations [9], damping ratio was assumed as 2,5% for 50 first modes of vibration, what is a typical value for this type of structure. Attention was paid to the problem of loading impuls duration and to the influence of phase angle ϕ in acceleration function on final results of calculations. Fourier analysis performed on digital analyser revealed the phase angle to be completely random.

It could have been expected, considering the sources of vibrations. In the series of numerical calculations ('dynamic loading 2.1') the phase ϕ was assumed as $0, \pi/4, \pi/2, \frac{3}{4}\pi, \pi$. The maximal values of displacements and accelerations did not change, provided the duration of loading impuls was long enough (at least 20 times the value of eigenperiod). These maximal values appeared usually at the end of loading duration. The correction in ϕ value may change the time instant of maxima or, in certain cases, peak values of acceleration or displacement can be transfered to the adjacent joints. It happens so, when peak values occur at the beginning of loading duration.

To evaluate the problem of loading duration, the same loading history ('dynamic loading 2.1') was applied thorough the period of 15, 30, 60 and 90 seconds. It has been found, that after 30 seconds of dynamic loading, maximal values of acceleration and displacement are not time-dependent up to 90 seconds of loading duration. In the range 15-30 seconds, peak values increase thereabout 13%. This fact may be explained due to the great number of dynamic degrees of freedom and associated modes of vibration, which interfere among each other, and due to damping coefficient.

The output files from numerical analysis of structure are very numerous. For it was not the main goal of this analysis, to provide quantitative estimations of displacements and accelerations entailed by different dynamic loadings, only some characteristic data are being presented.

They elucidate ways, in which the construction responds to dynamic loadings and allow to reveal the most probable reason for the movement of floor-slabs.
Results of numerical calculations for 'dynamic loading 1' coming from road traffic (loading spectrum - Table 6.1.) are summarized in Fig. 6.8 in the form of graphs for joints maximal displacements and accelerations. These are maximal values after superposition of all results obtained for 6 different frequencies and amplitudes.

Results of the same kind for 'dynamic loading 2.1', entailed by crane induced acceleration spectrum given in equation (6.14) are shown in Fig. 6.9. The influence of 'beating frequency' is expressed by loading of this type.

In similar way, accelerations and displacements for 'dynamic loading 2.2' described by formula (6.15) are provided in Fig. 6.10. The loading function of support acceleration was evaluated on the basis of Fourier analysis of the crane induced vibrations.

Finally, the outcomes of the analysis performed for 'dynamic loading 3' - wind spectrum (Fig. 6.7) are outlined in Fig. 6.11.

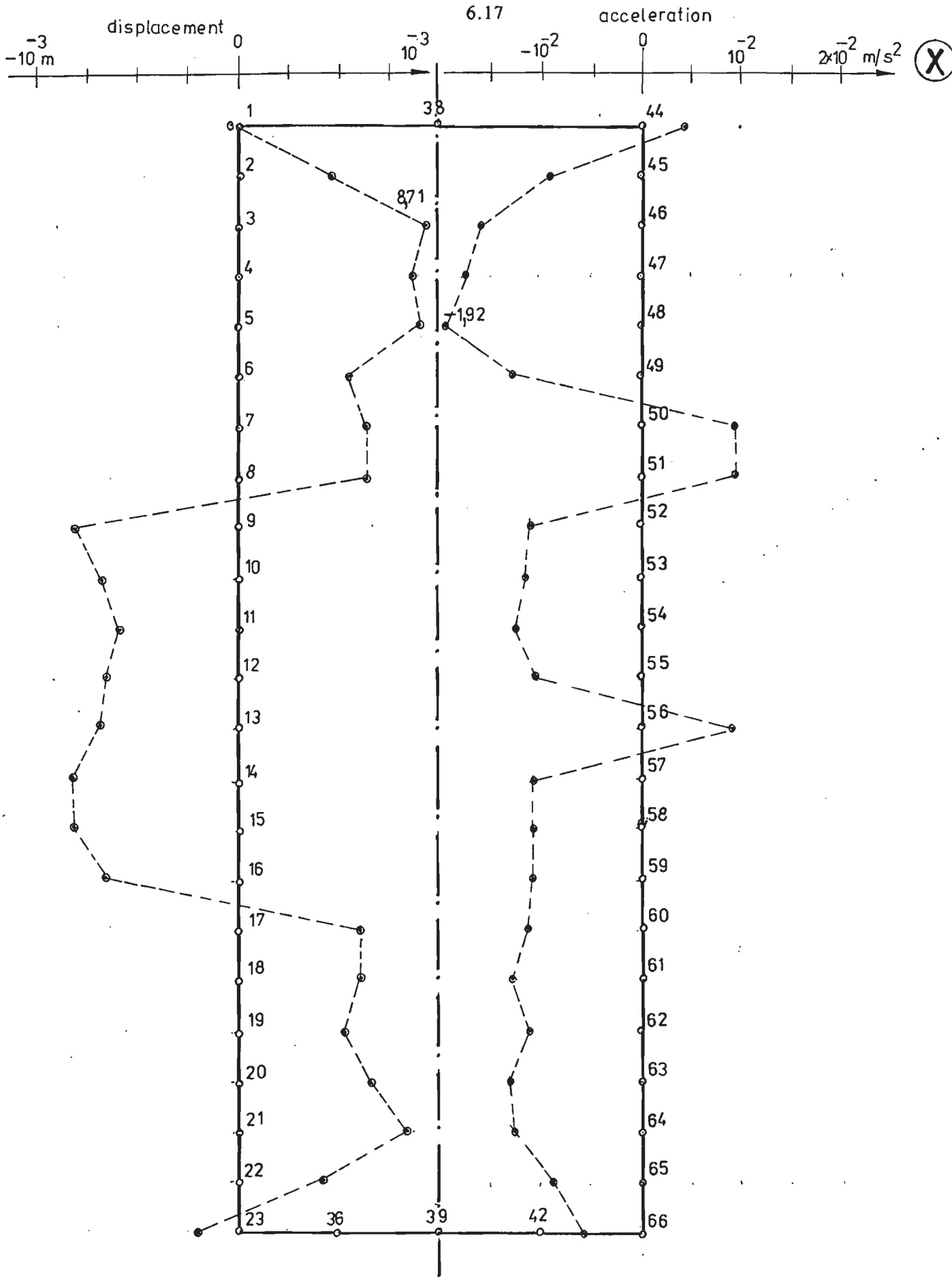


Fig. 6.8. Results of numerical calculations for 'dynamic loading 1' - traffic induced vibrations.

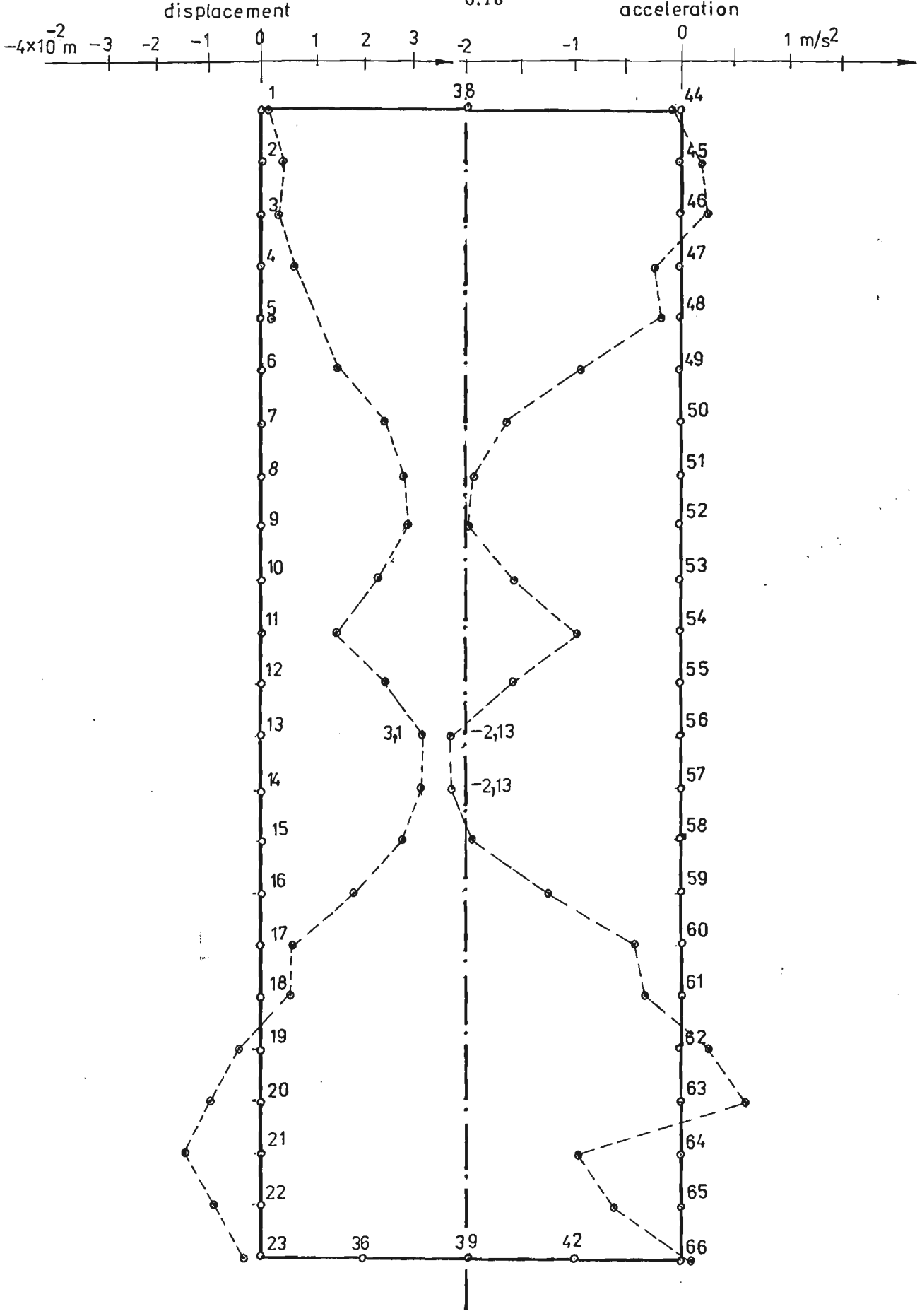


Fig. 6.9. Results of numerical calculations for 'dynamic loading 2.1' - beating frequency induced by crane.

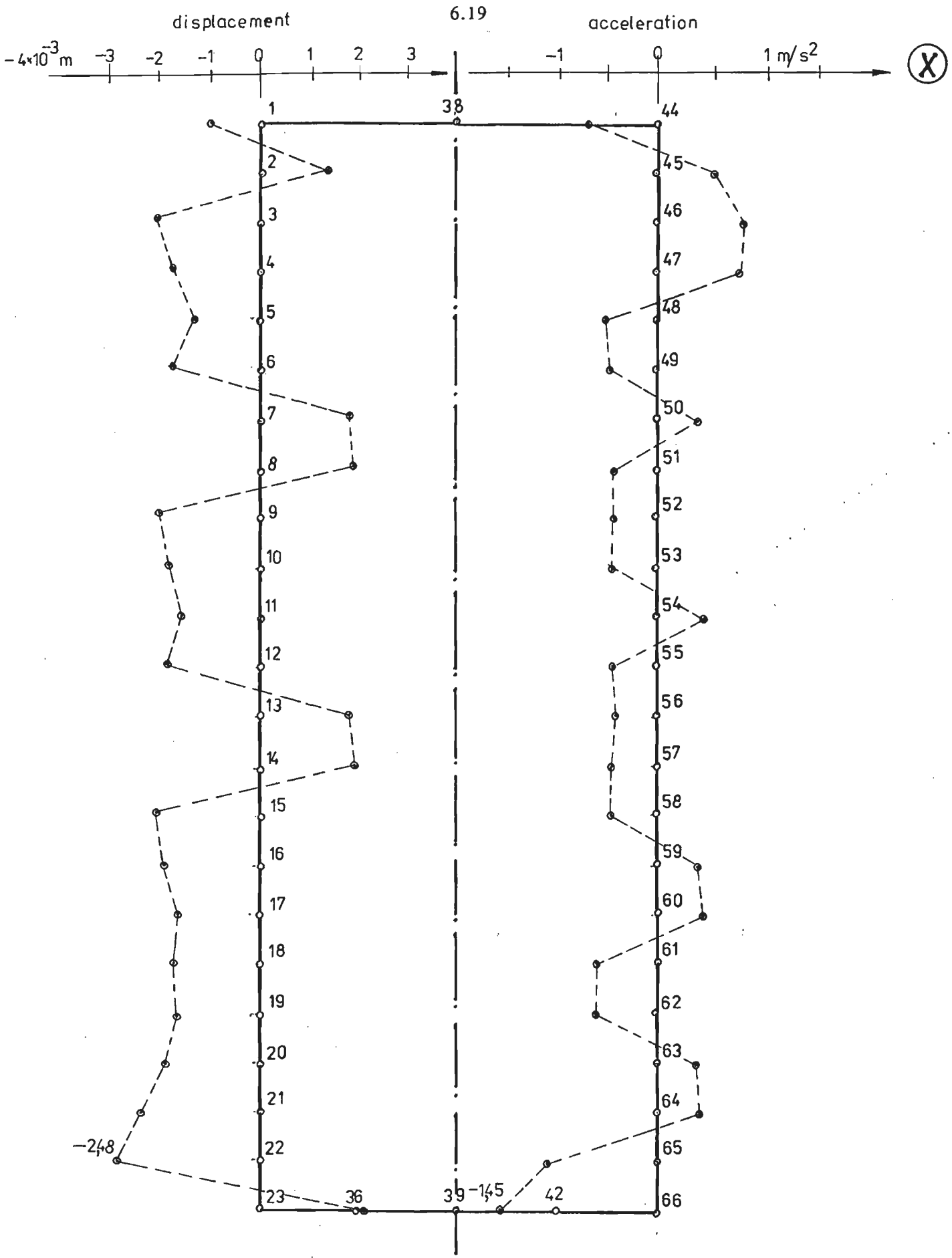


Fig. 6.10. Results of numerical calculation for 'dynamic loading 2.2' - Fourier analysis of the crane induced vibration.

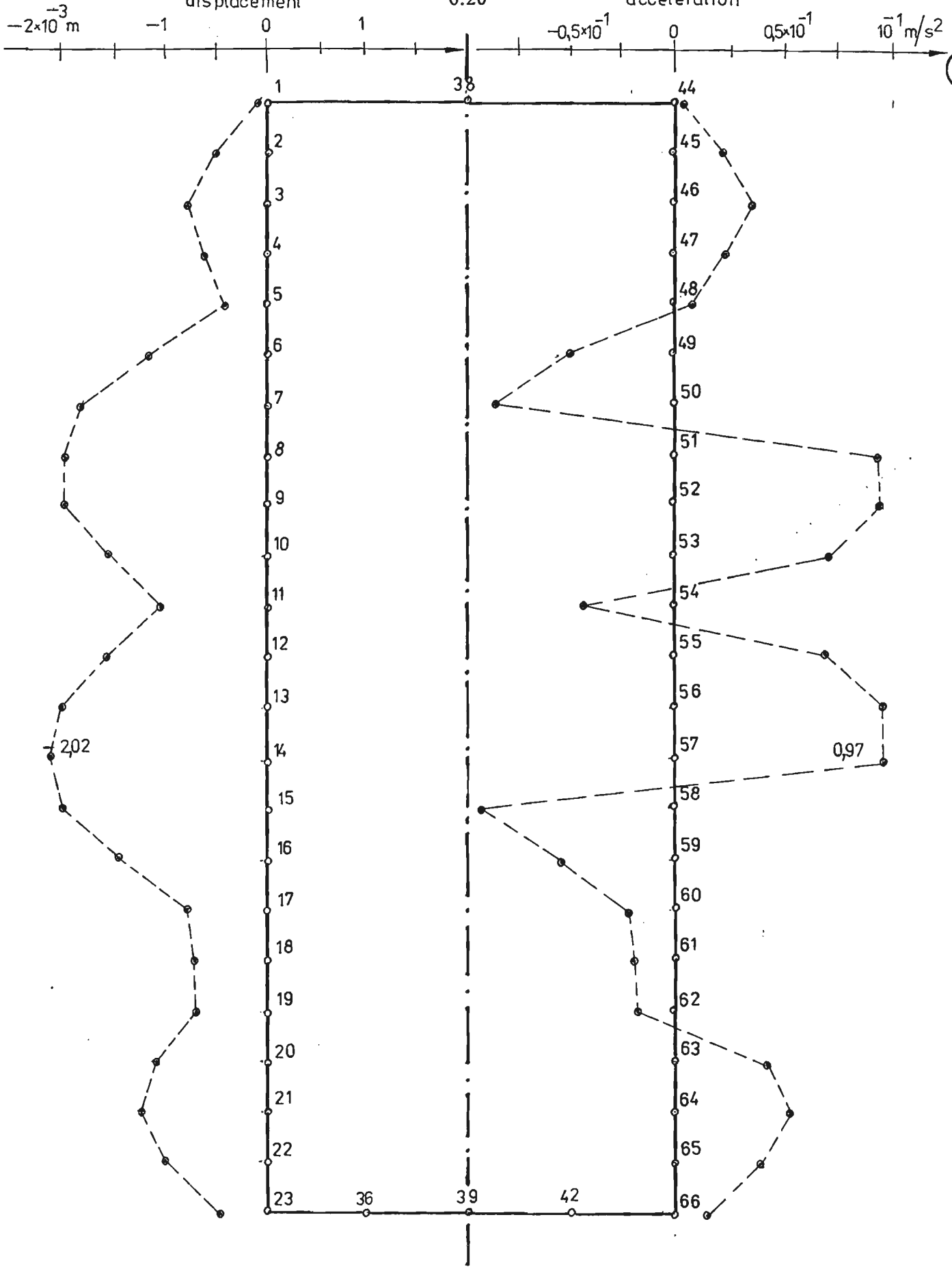


Fig. 6.11. Results of numerical calculation for 'dynamic loading 3' - wind spectrum from Fig. 6.7.

Even a superficial analysis of the results presented above shows, that maximal values of accelerations for each of the dynamic loadings differ between one another of about one order of magnitude. The least absolute values of acceleration and displacement were obtained for traffic induced vibrations. Their magnitude is thereabout 0.019 m/s^2 and 0.0087 m, while for wind loading the same quantities mount to 0.1 m/s^2 and 0.002 m. Without any doubts, the largest amplitudes of displacement and acceleration are entailed by dynamic loading connected with vibrations generated by crane - 2,13 m/s^2 and 0.031 m.

One may notice, that acceleration spectra act on structure only in lateral direction, however there exists also a vertical gradient of acceleration due to Rayleigh waves propagation.

The combination of lateral and vertical loadings does not change a lot magnitudes of lateral acceleration (below 0.1%). Since the difference between vertical and horizontal component of acceleration is of the order 10^{-10}-10^{-15}, it does not really matter, whether the vertical component is taken into account. This comes from the fact, that vertical stiffness of structure is much more greater than the lateral one.

7. Conclusions and recommendations

Eventual discussion about probable mechanism of floor-slabs movement should stem from the formulation of the necessary conditions, which have to precede this phenomenon. From kinematic point of view, the slab movement can commence only in this moment, when the lateral force F (or acceleration) exceeds the value of the friction force T at the support. It is shown schematically in Fig. 7.1.

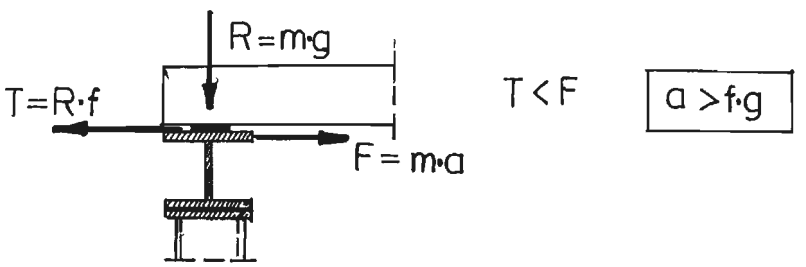


Fig. 7.1. Configuration of forces at the floor-slab support.

In that way we have defined the lower limit for the horizontal acceleration of the support, necessary for initiation of slab displacement. Experiments performed on kinematic conditions at the support, revealed the existance of characteristic 'depression' of friction coefficient. This phenomenon is connected with the 'glue rollers' formation in contact layer between steel girder and rubber band. It commences after 0,002-0,005 m displacement of concrete slab. In the moment of placing a concrete slab on supports, small movement of rubber band may be forced by crane or slab-sling. It leads directly to the situation, when real friction coefficient is very low (less than 0,2), so the minimal acceleration necessary for the initiation of slab movement is thereabout 1,9 m/s^2.
Friction coefficient may vary in wide range (0,2-0,6) due to unevenness of surfaces and due to changes in rotation angle at the support.
Among structural characteristics, the global stiffness of the structure is of primary concern. Global stiffness is furnished by spatial interconnections among elements, which are provided in full scale at the end of erection phase.

At the beginning of assembling, lateral stiffness of structure is assured mainly by rotation constraints in column-to-base connections and by some bracings among columns. The eigenfrequency of the floor slabs - steel skeleton system can be relatively low and takes values from the range 0.7-1.5 Hz. In the moment of slabs assembling, continuous foundation was located in incoherent made-ground. Stiff ground - slab was casted afterwards. Lateral flexibility of foundation and ground properties favourable for transmitting Rayleigh waves, acted together so, that vibrations generated at the ground surface could have been transfered directly on the construction.

Some of the factors, which are comonly considered as being 'cumbersome' during displacement analysis of structure, were excluded in the preliminary considerations. These are: creep and shrinkage of concrete and thermal effects. Also the dead load of floor-slabs themselves is not a kind of loading, capable of being the reason for slabs movement.

According to site-measurements and numerical calculations, the traffic induced vibrations cannot be considered as a source of acceleration strong enough to move on slabs.

The accelerations of joints initiated by wind-loading spectrum are also too small. However, it should be put forward clearly, that it is certainly possible to create wind-spectrum with sufficient strength. Wind-pressure fluctuations are purely stochastic process, so we may deal with wind-loading in terms of probability only. Wind spectrum used in numerical calculations was evaluated for relatively strong wind (v = 18,6 m/s), and still, the values of accelerations are not higher than 0.1 m/s^2.

The only source of vibrations, having enough energy to increase the values of acceleration up to the limit of 2.0 m/s^2, are crane-induced vibrations. Dynamic calculations demonstrated, that even 30 seconds impulses are able to develope the accelerations having amplitudes above 1,0 m/s^2. The strongest vibrations are developed during operations with the line ('line-up', 'line-down'), turning the crane around, and while the second engine of the crane is activated. This last phase is connected with the period of crane dismanteling. Magnitude of accelerations provided by numerical calculations increases up to 2,0 m/s^2 and displacements reach value 0,03 m.

This observation pertains to the both loading histories connected with the vibrations produced by crane. Thereby, we may come to the conclusion, that the process of slabs movement itself, could have last for a relatively short period of time and was a matter of minutes, not hours.

The whole event could have happened during the phases of crane dismanteling.

Still, there is a minor probability, that some other reasons for slabs movement at the supports exist. Considering experimental data, results of numerical calculations and informations from the contractor, the explanation presented above is the most satisfactory one.

Briefly speaking, the phenomenon of slabs displacement at the supports ought to be regarded in broader context.

It was a coincidence of a few unfavorable factors taking place at the same time:

- the presence of incoherent made-ground being a perfect carrier for Rayleigh waves,
- decreased lateral stiffness of the foundation due to the lack of ground-floor slab,
- the lack of connections among prestressed concrete slabs,
- small lateral stiffness of slab-beam-column system having the eigenfrequency value $f_e \approx 1$ Hz,
- application of rubber band with adhesive glue layer at the supports of prestressed-concrete slabs,
- activity of a heavy crane generating ground accelerations.

These factors create the most probable scenario for the phenomenon of slabs displacement. It should be pointed out that this unfavorable coincidence could have been hardly anticipated in practice.

Some recommendations may be formulated due to above conclusions:

- It may be advised to apply the rubber band without glue layer at the supports of slabs, what results in increased friction,
- Spatial stiffness of the structure with big-masses system should be increased in the assembling phase. It ought to be performed with the cooperation of the designing office. One should notice, that frequency of free vibrations - thereabout 1 Hz, is very low and rather uncommon for structure of this type. Were it not for this fact, slabs would not have moved on probably.
- While using the heavy crane for fitting the floor-slabs, their locations should be under permanent control during all phases of the crane operation.

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APPENDIX 1

Photographic documentation

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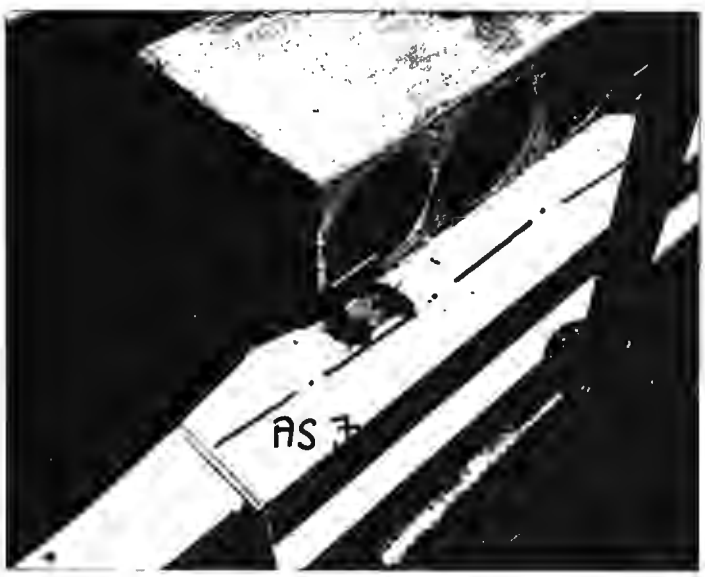

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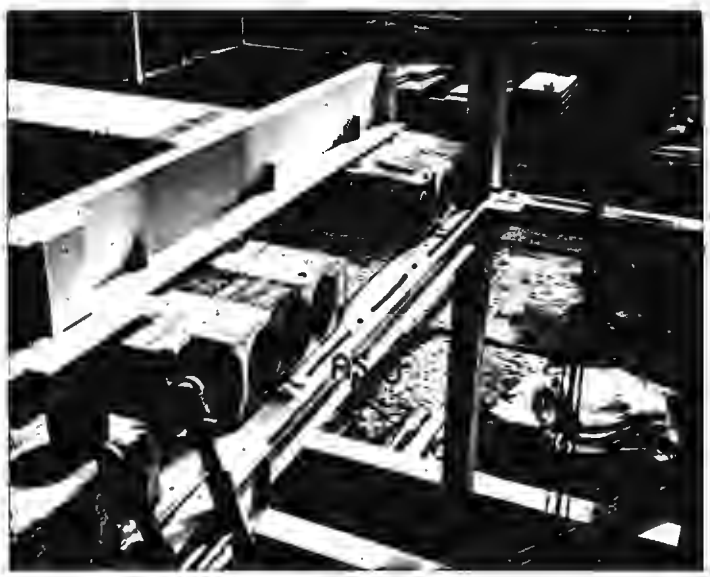

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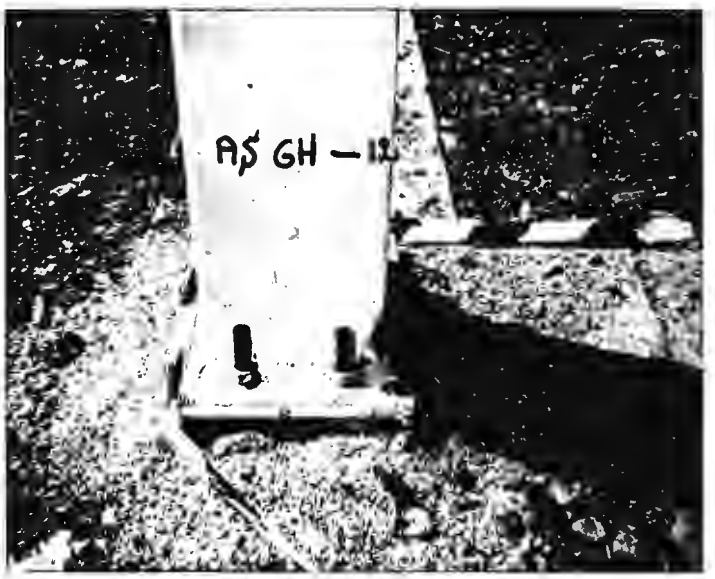

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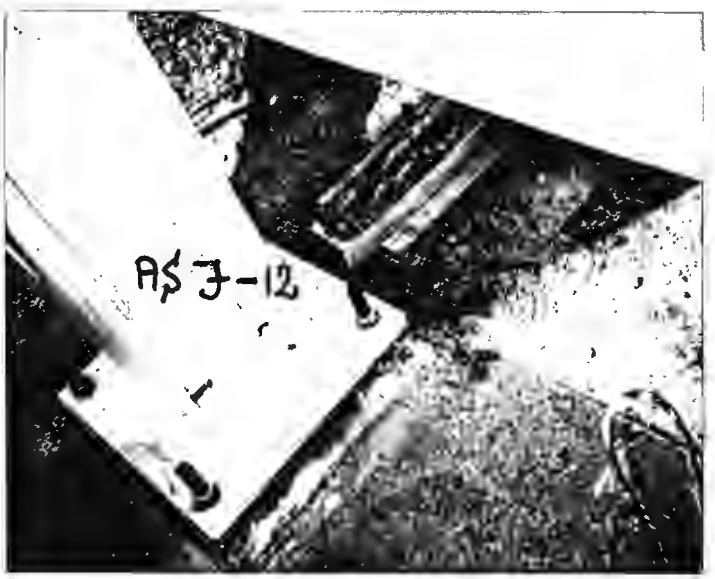

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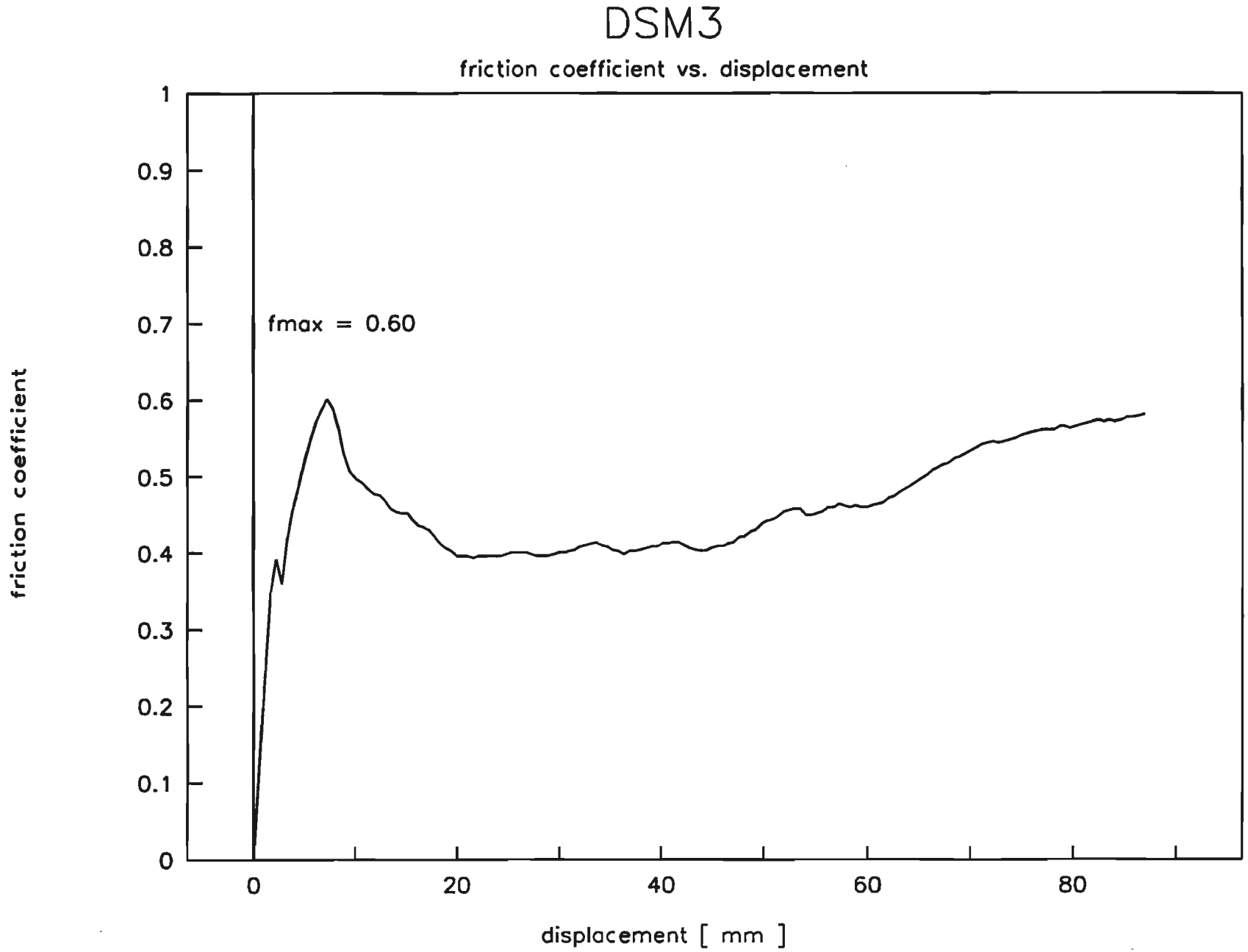
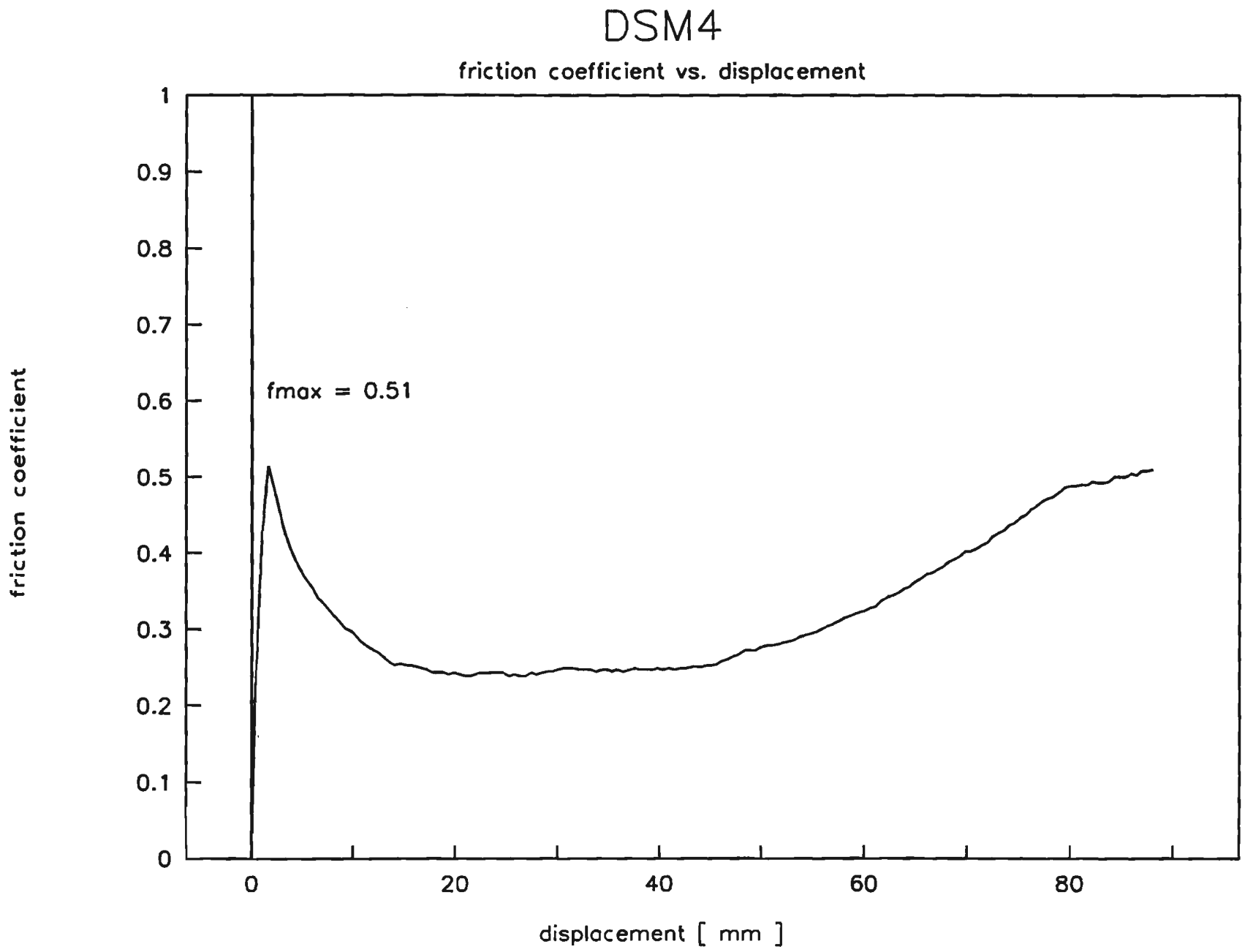
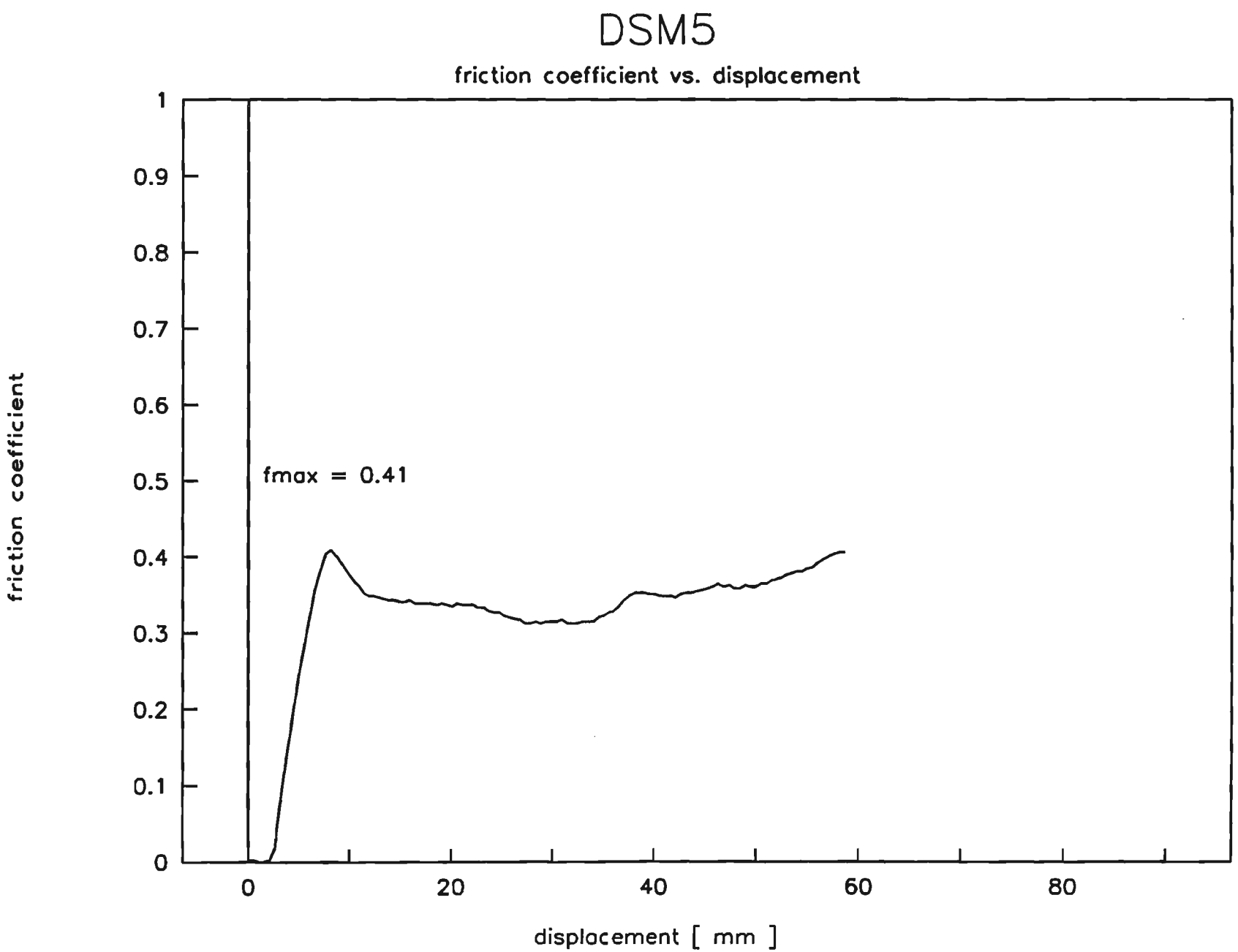
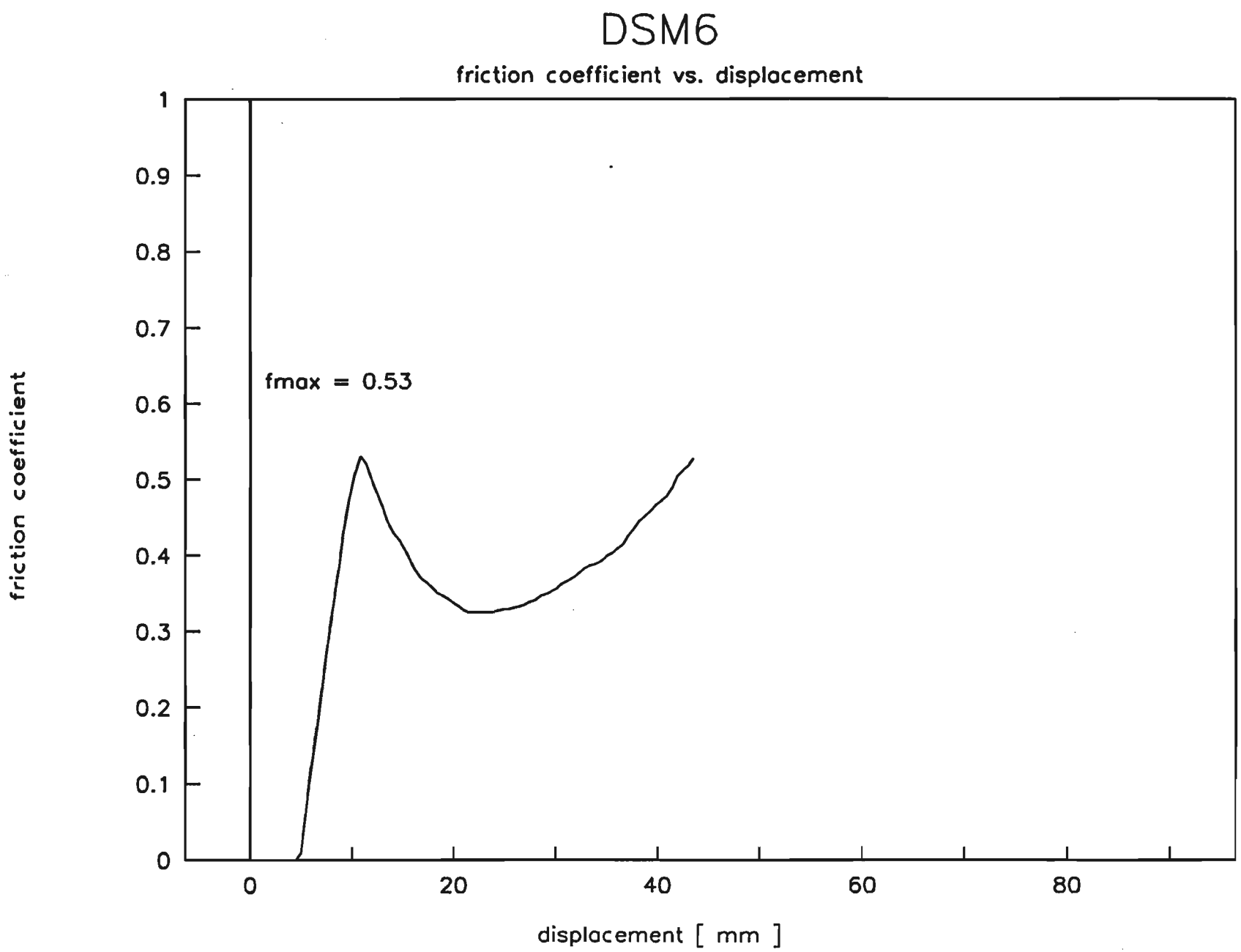
APPENDIX 2

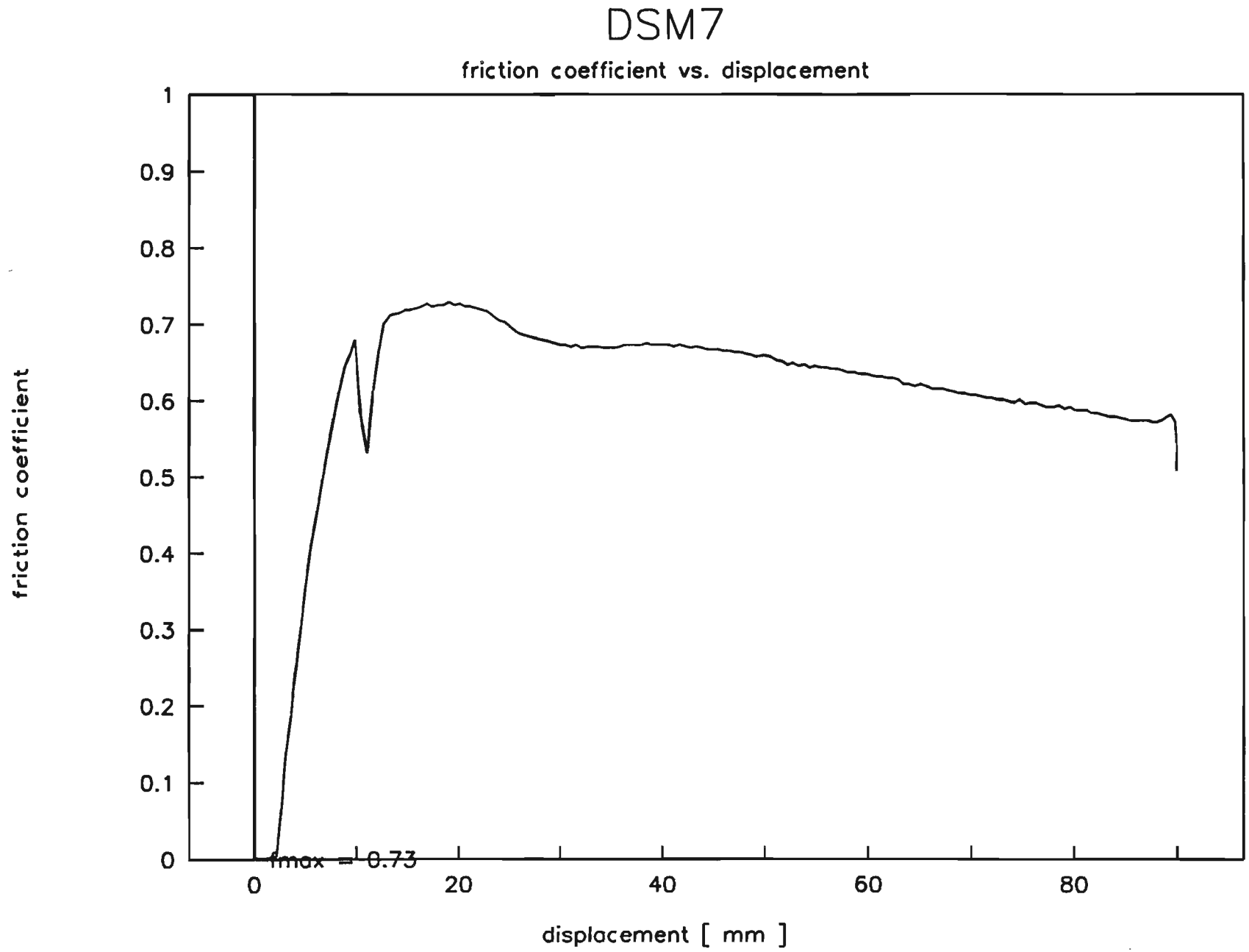
Results of friction coefficient measurements

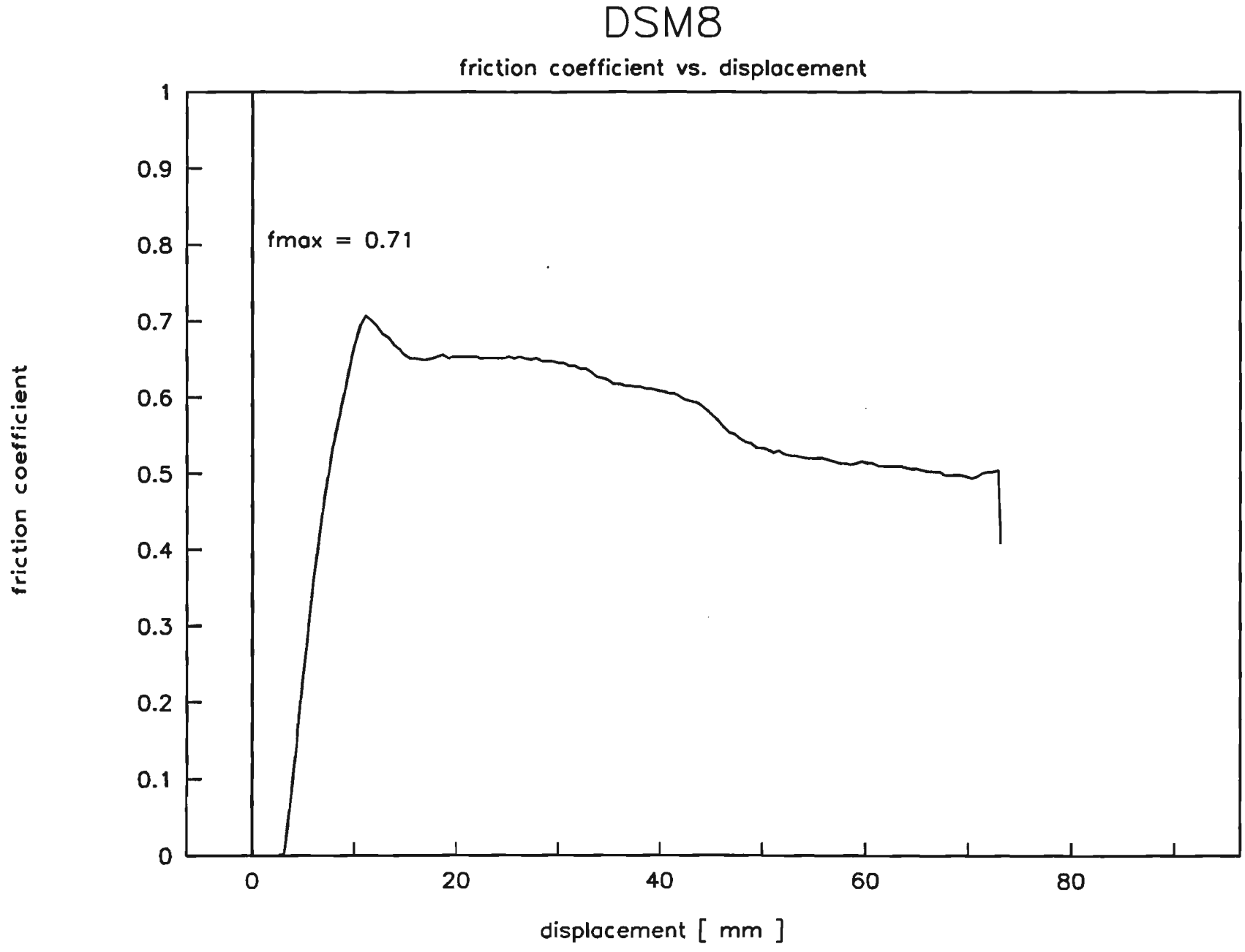

DSM3
friction coefficient vs. displacement
fmax = 0.60
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

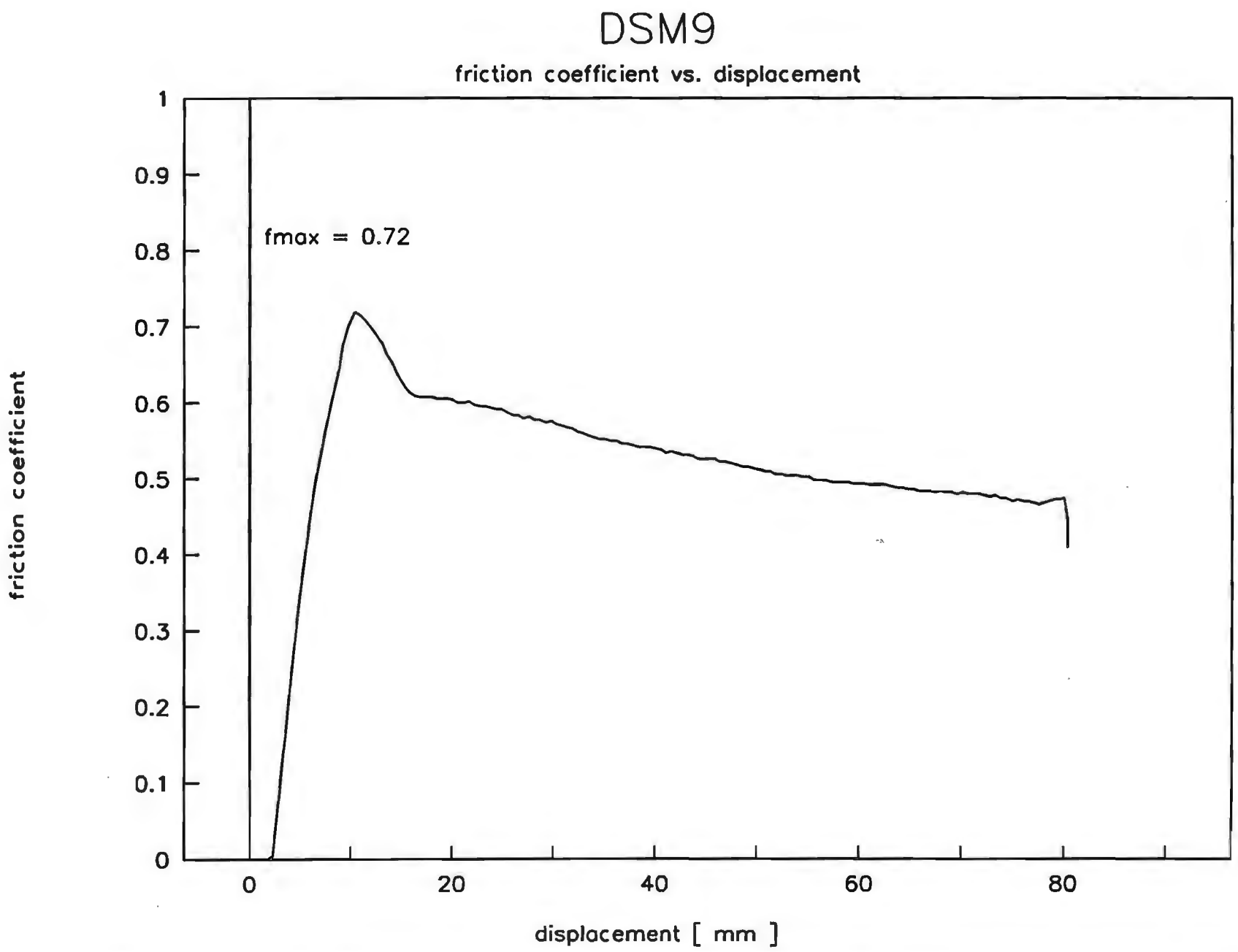

DSM4
friction coefficient vs. displacement
friction coefficient
displacement [mm]
fmax = 0.51
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

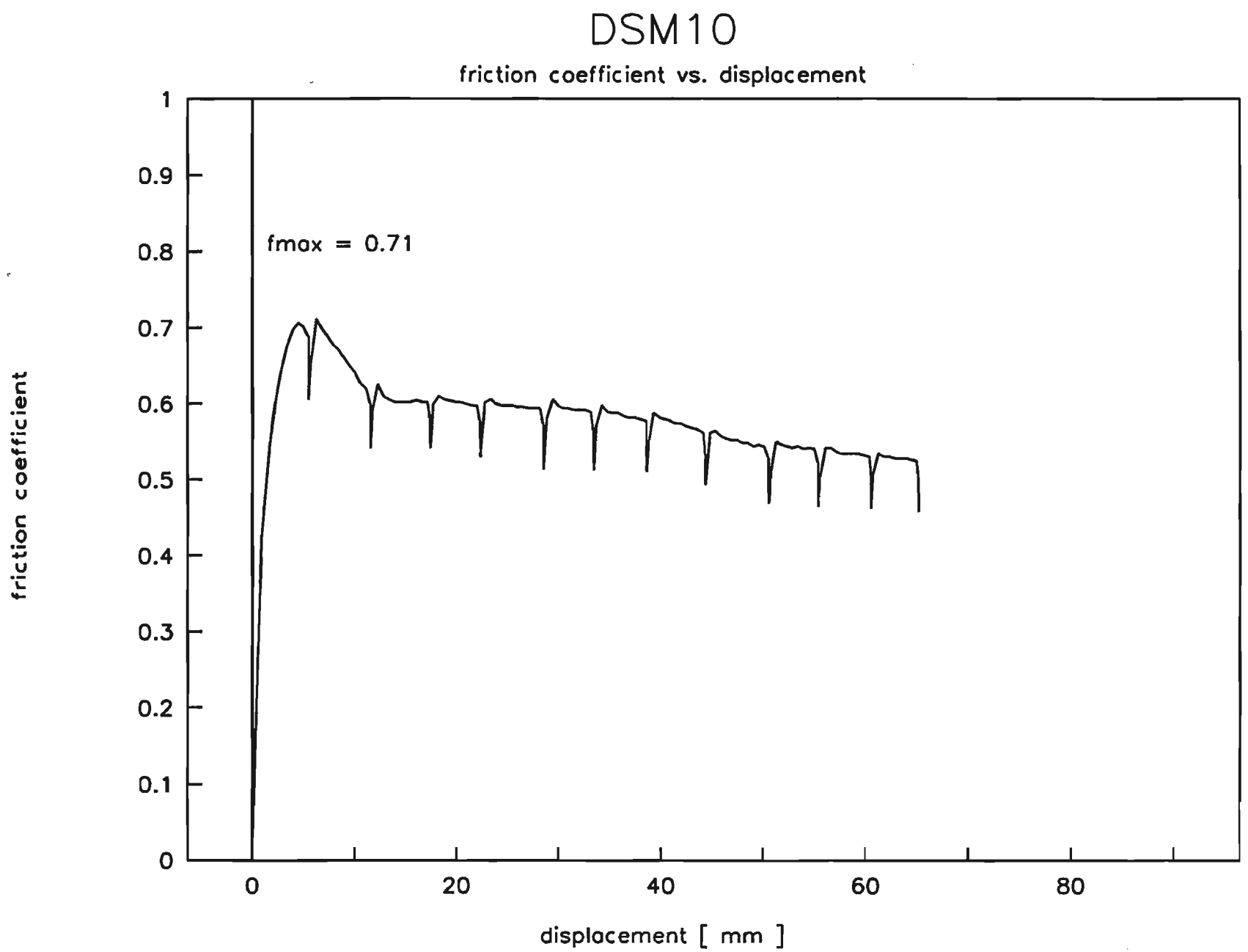

DSM5
friction coefficient vs. displacement
friction coefficient
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
fmax = 0.41
0
20
40
60
80
displacement [mm]

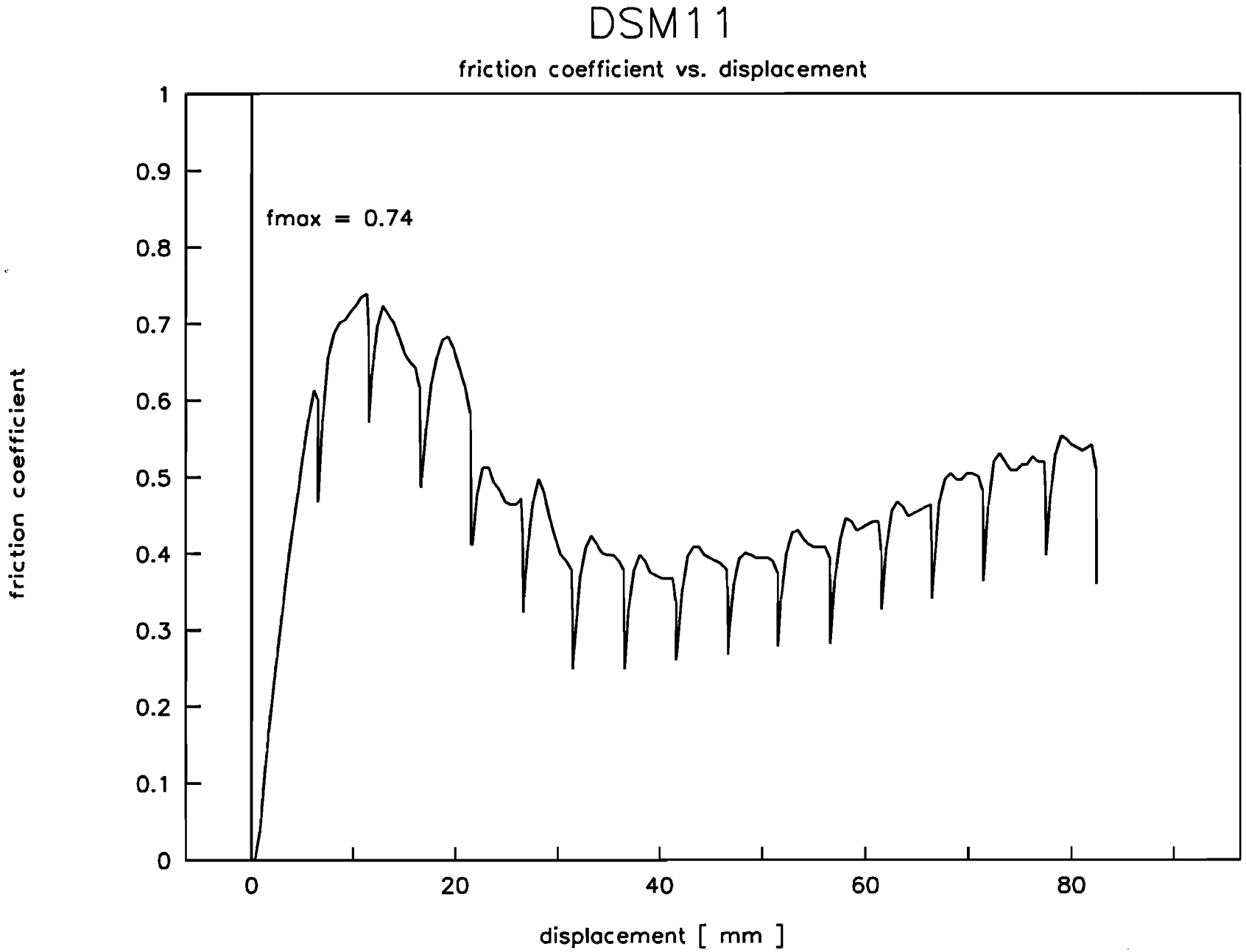

DSM6
friction coefficient vs. displacement
fmax = 0.53
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80


DSM7
friction coefficient vs. displacement
friction coefficient
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
fmax = 0.73
0
20
40
60
80
displacement [mm]


DSM8
friction coefficient vs. displacement
fmax = 0.71
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

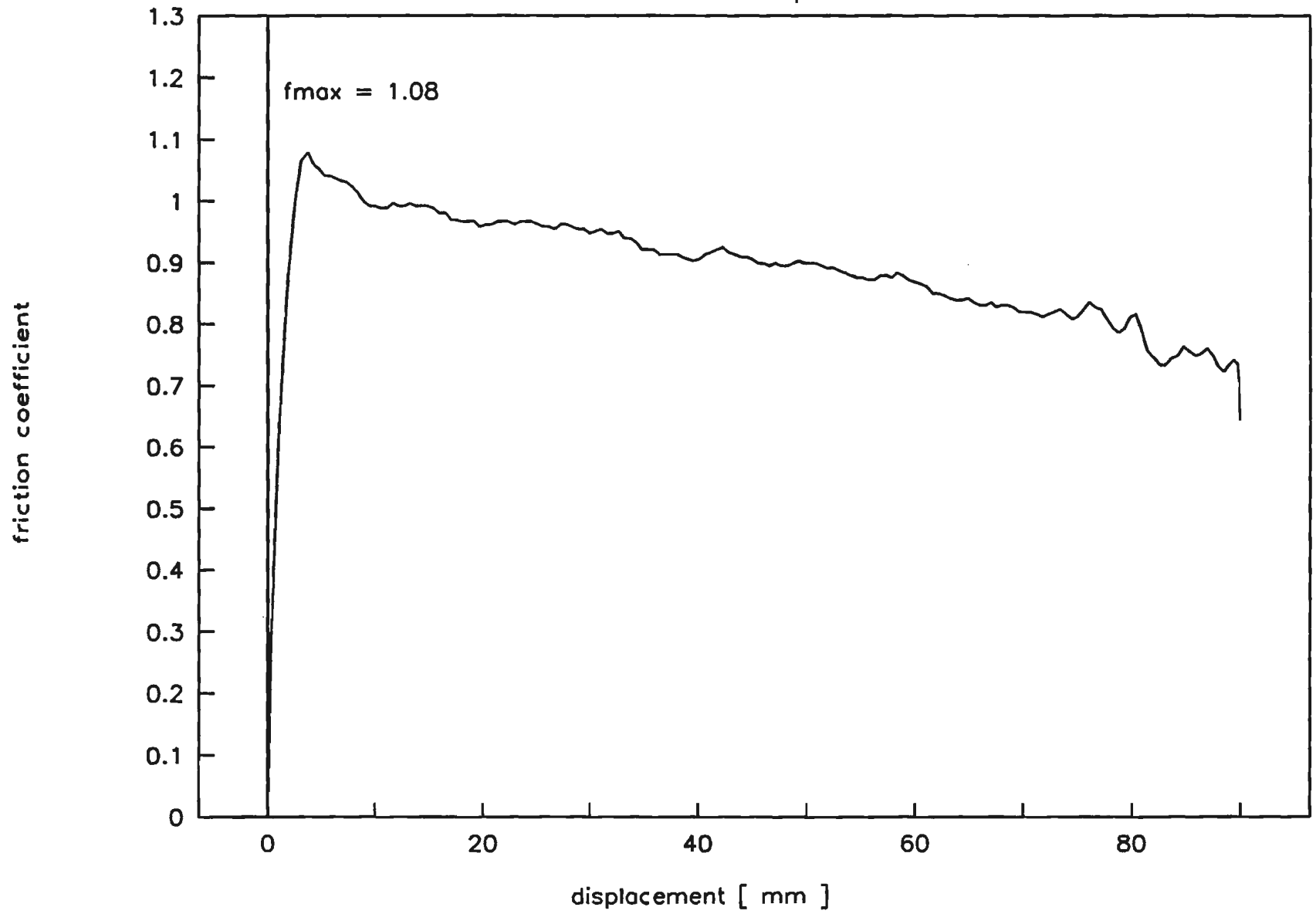

DSM9
friction coefficient vs. displacement
fmax = 0.72
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

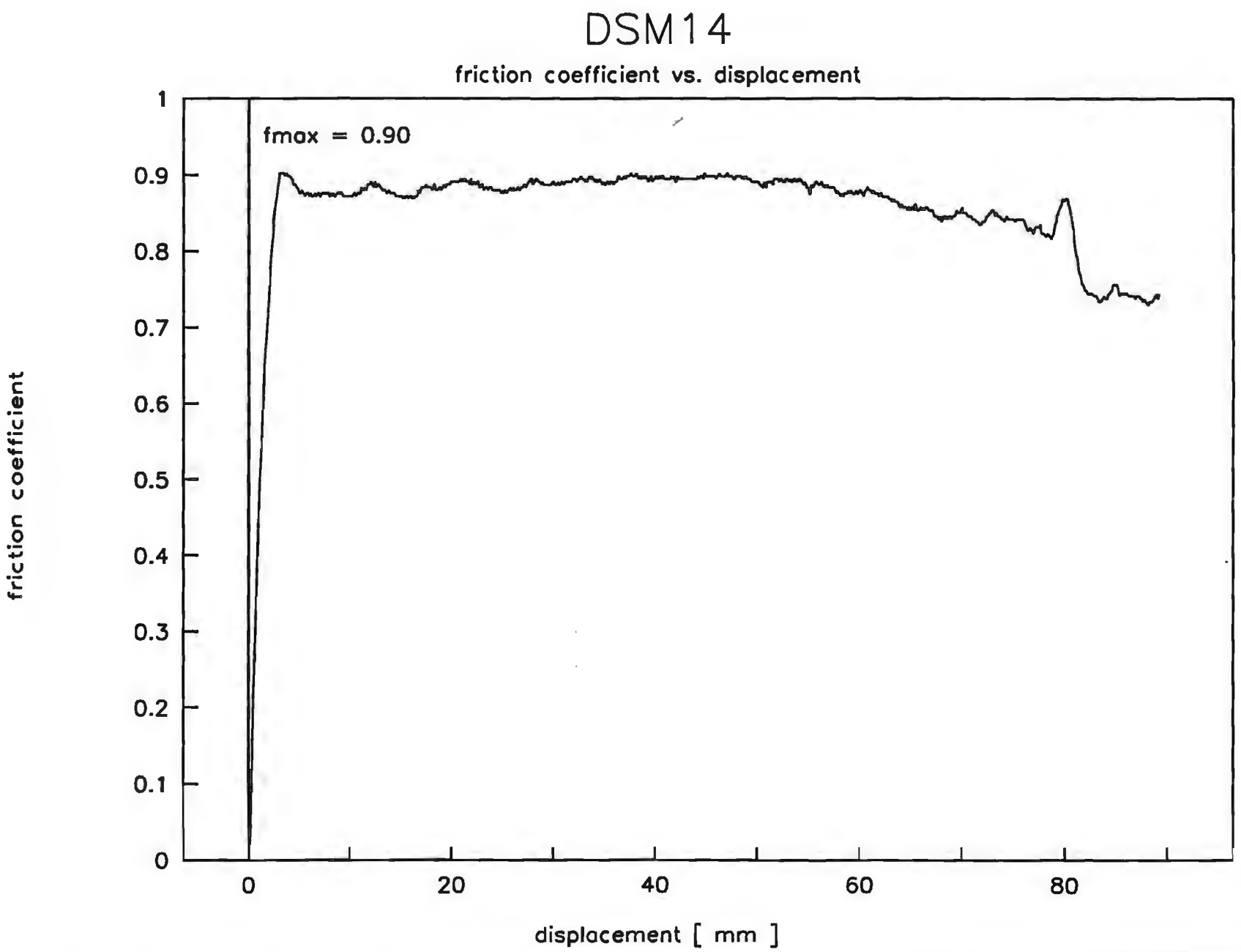

DSM10
friction coefficient vs. displacement
fmax = 0.71
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80


DSM11
friction coefficient vs. displacement
fmax = 0.74
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

DSM13

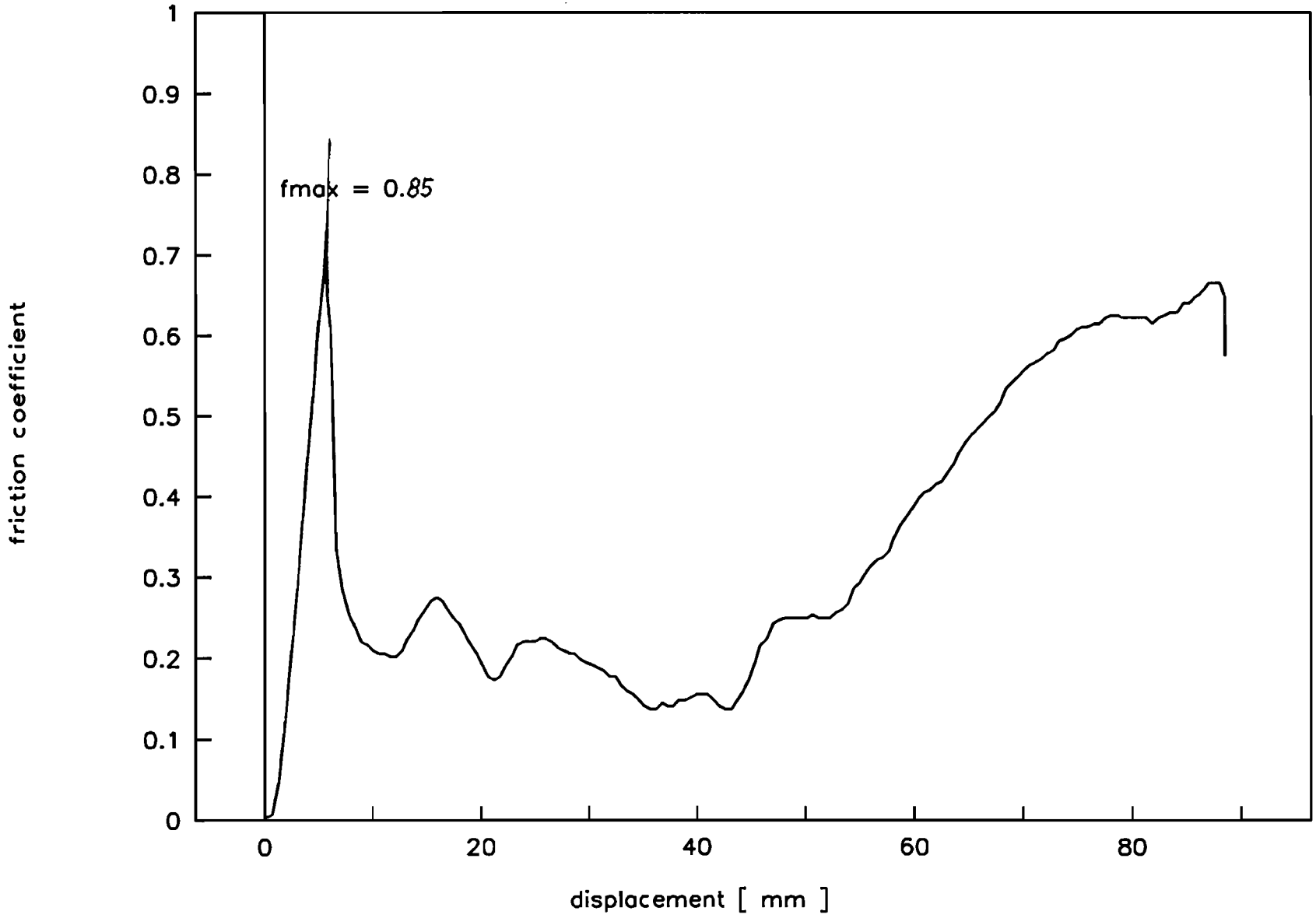
friction coefficient vs. displacement

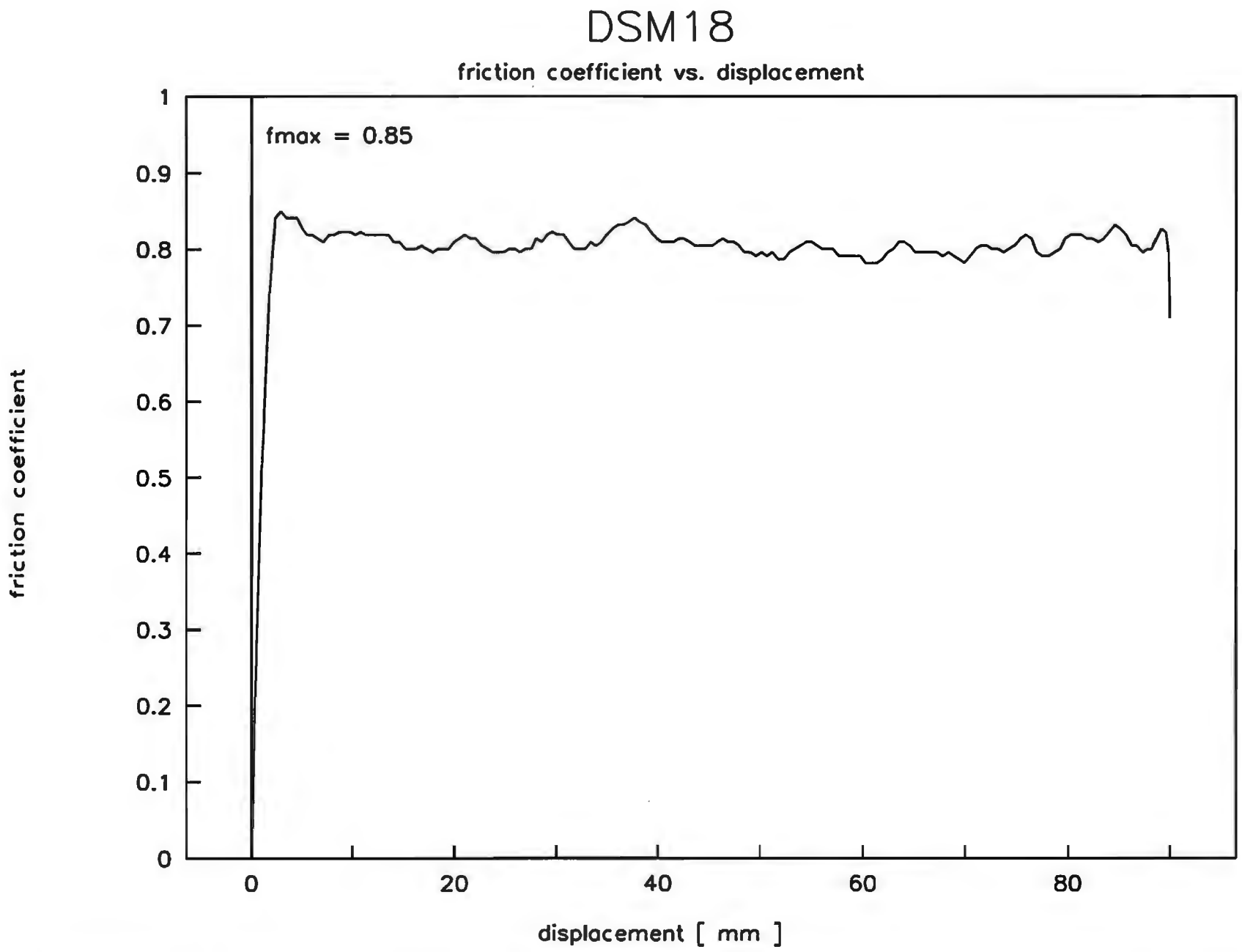


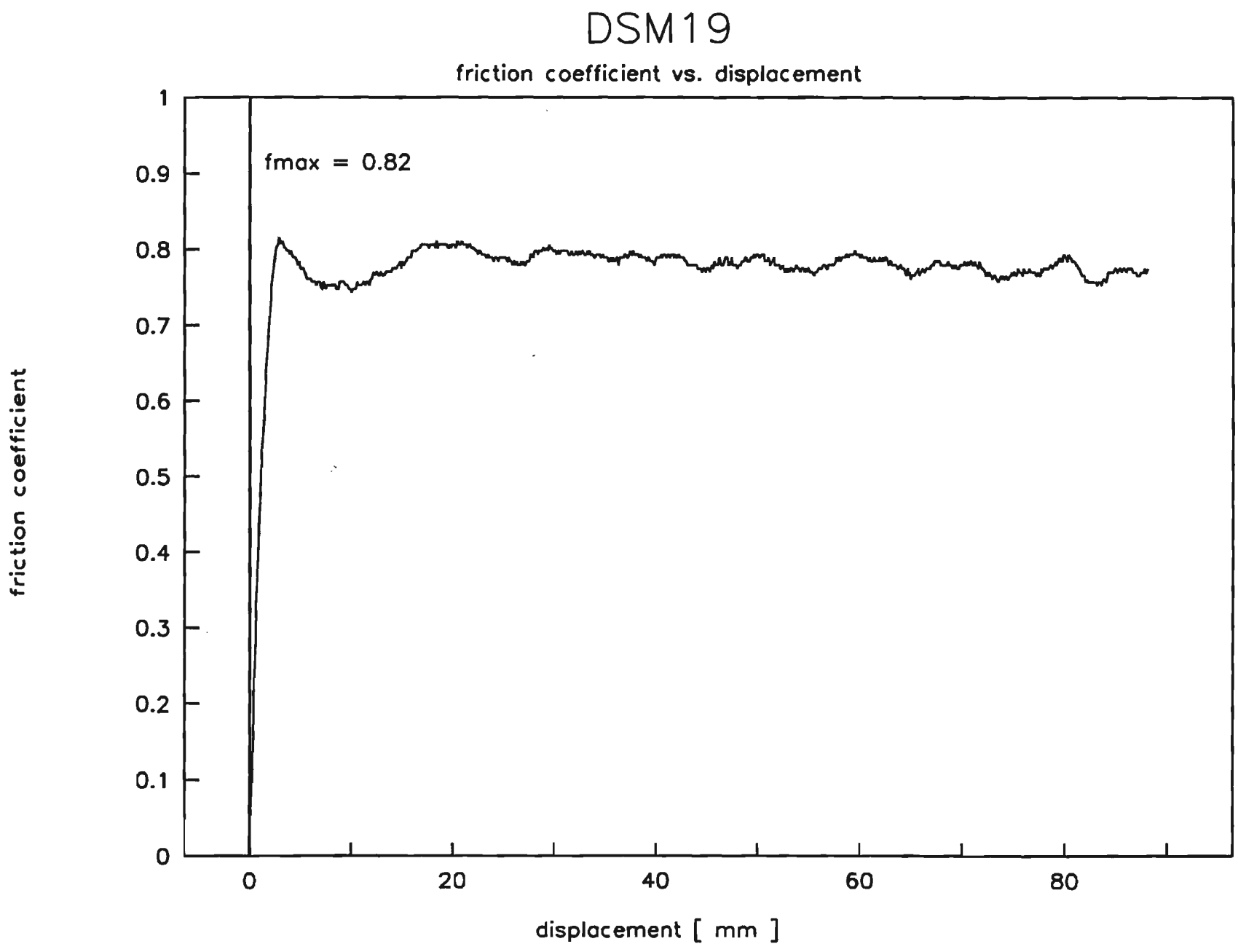

DSM14
friction coefficient vs. displacement
fmax = 0.90
friction coefficient
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
displacement [mm]

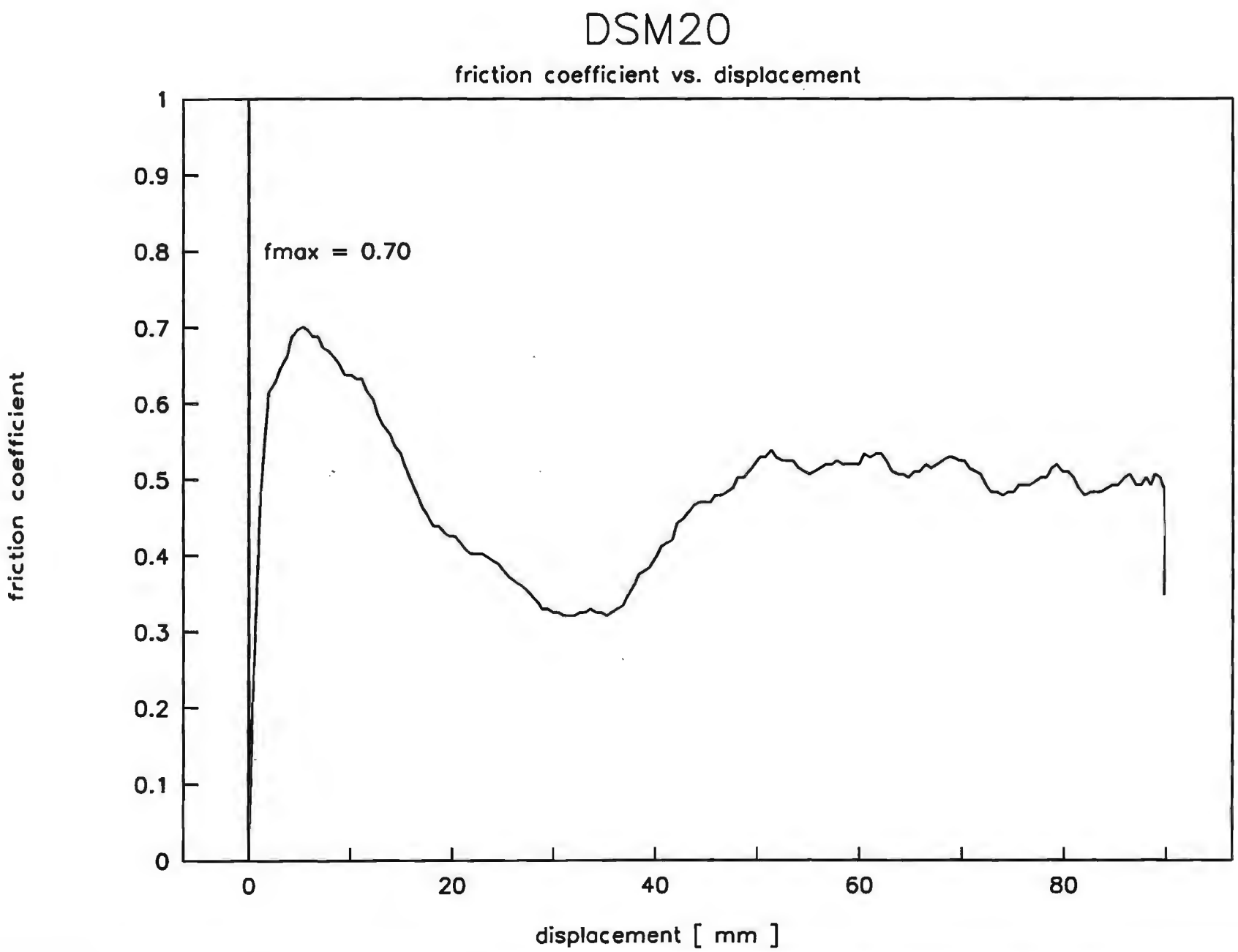
DSM17

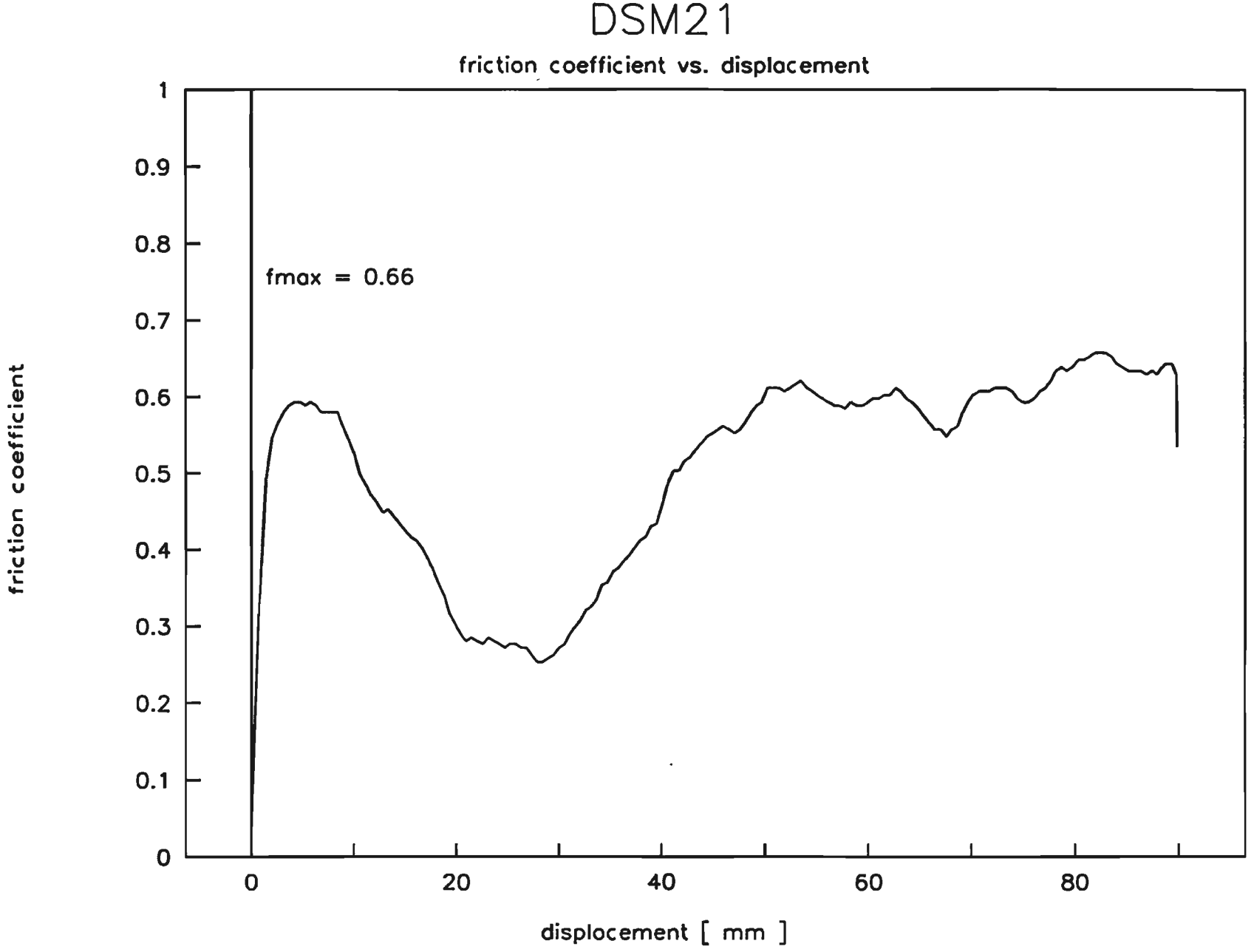
friction coefficient vs. displacement

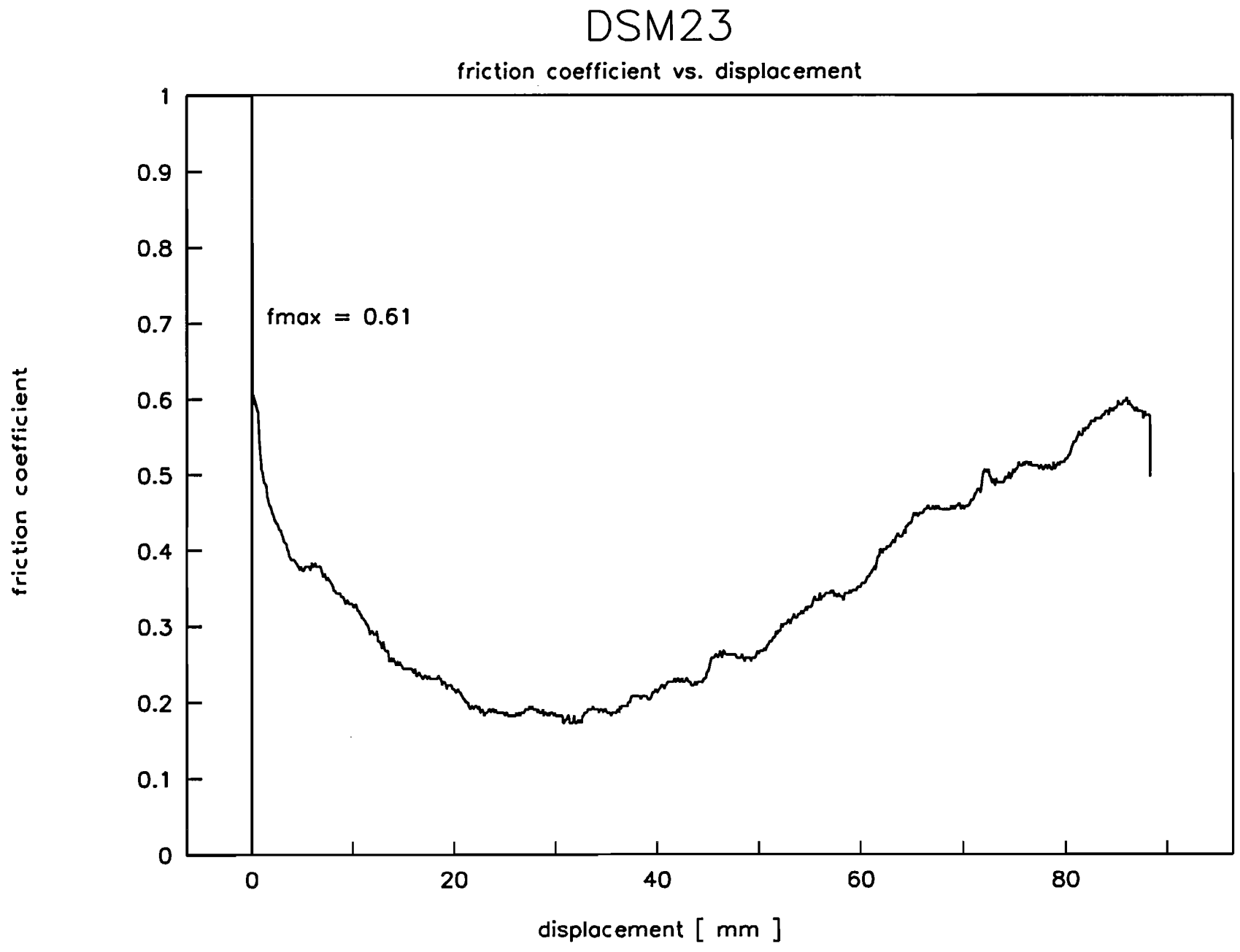


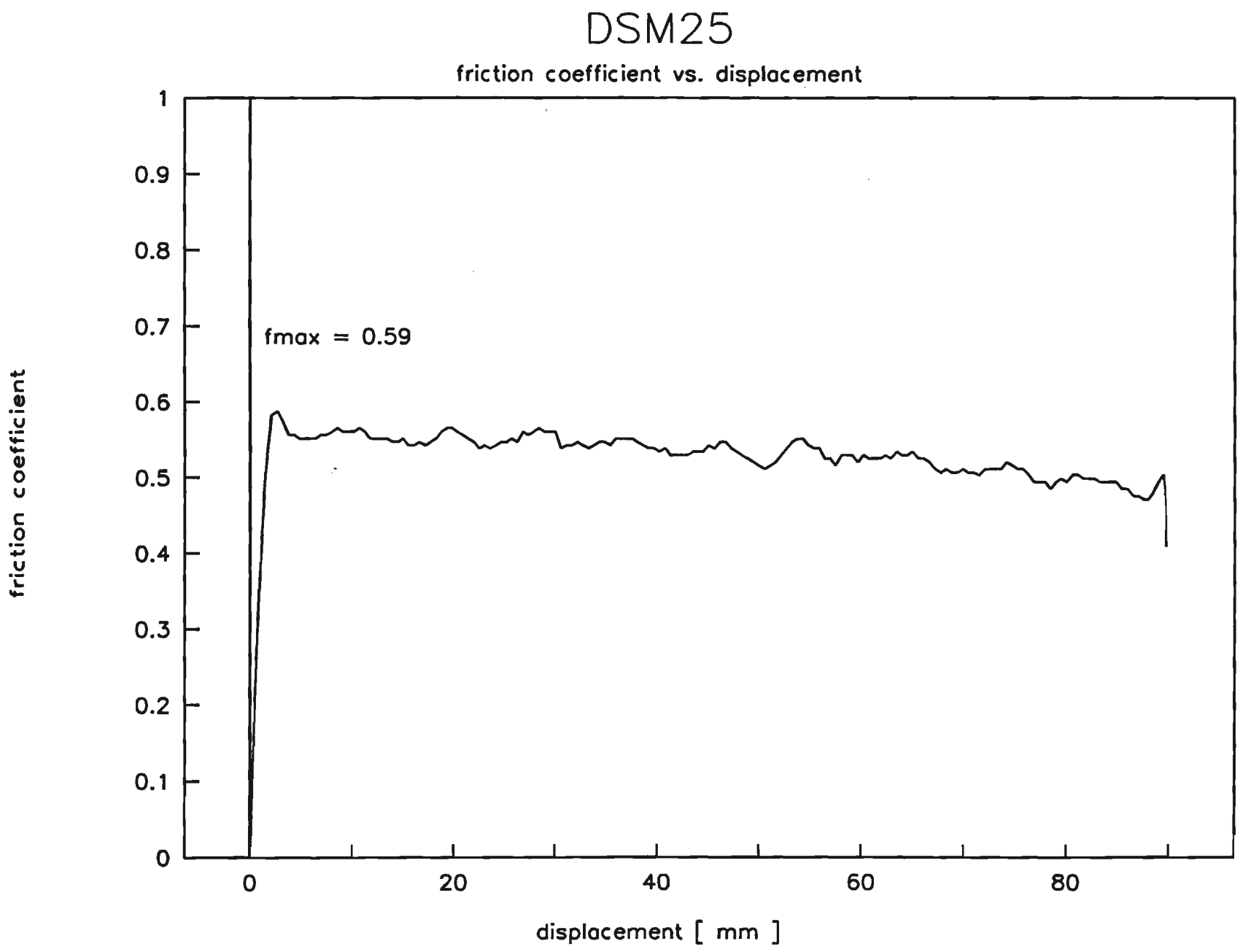

DSM18
friction coefficient vs. displacement
fmax = 0.85
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

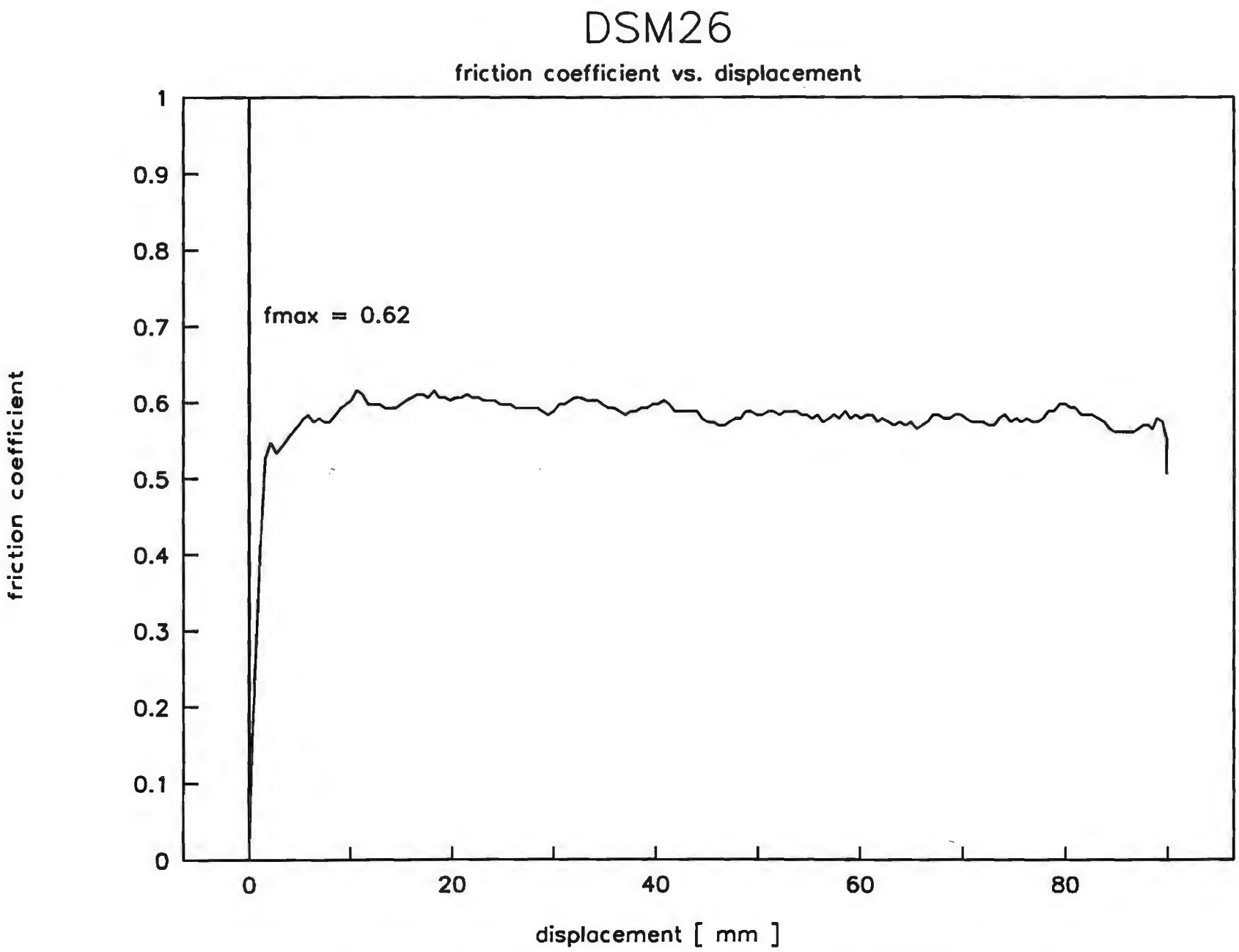

DSM19
friction coefficient vs. displacement
fmax = 0.82
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

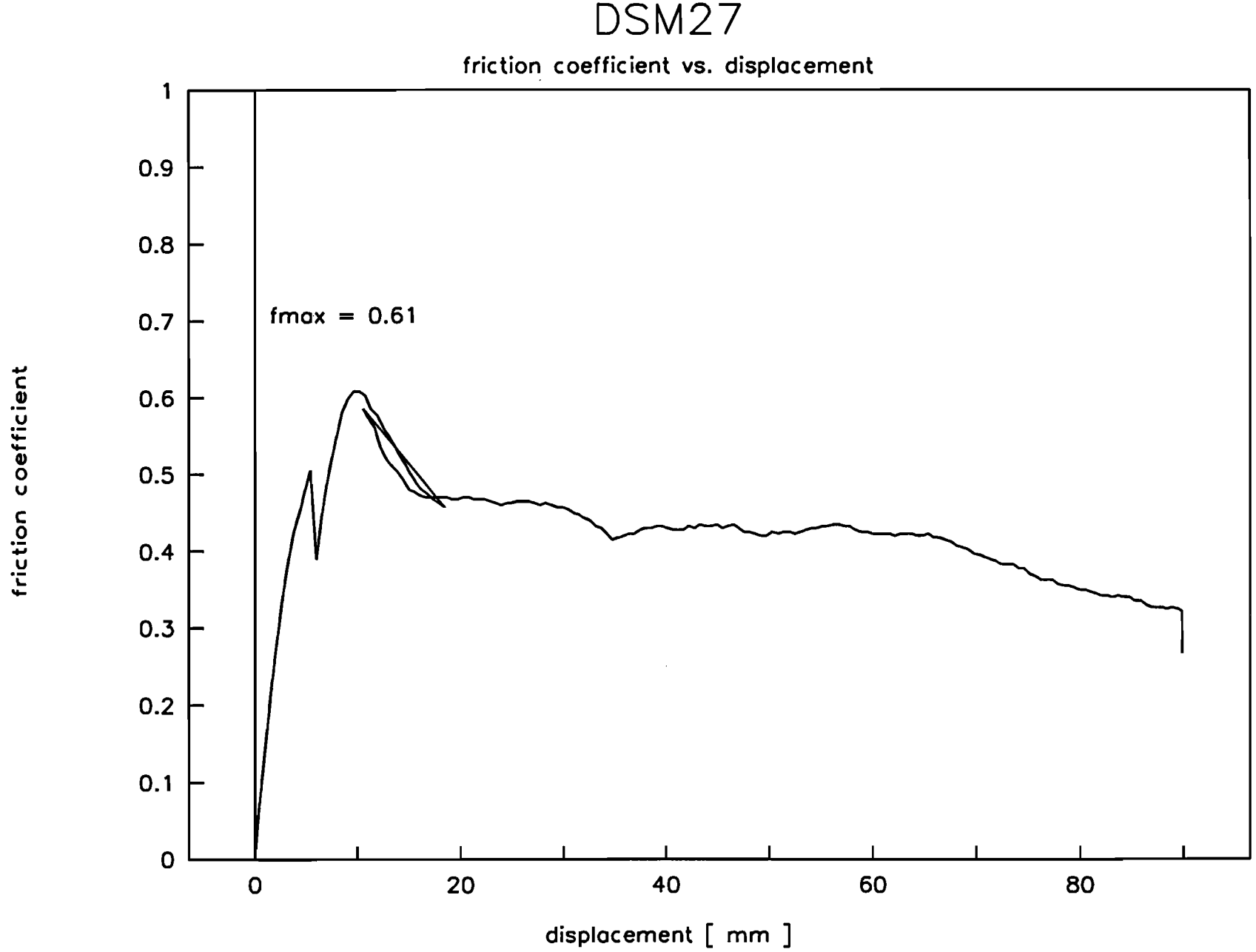

DSM20
friction coefficient vs. displacement
fmax = 0.70
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

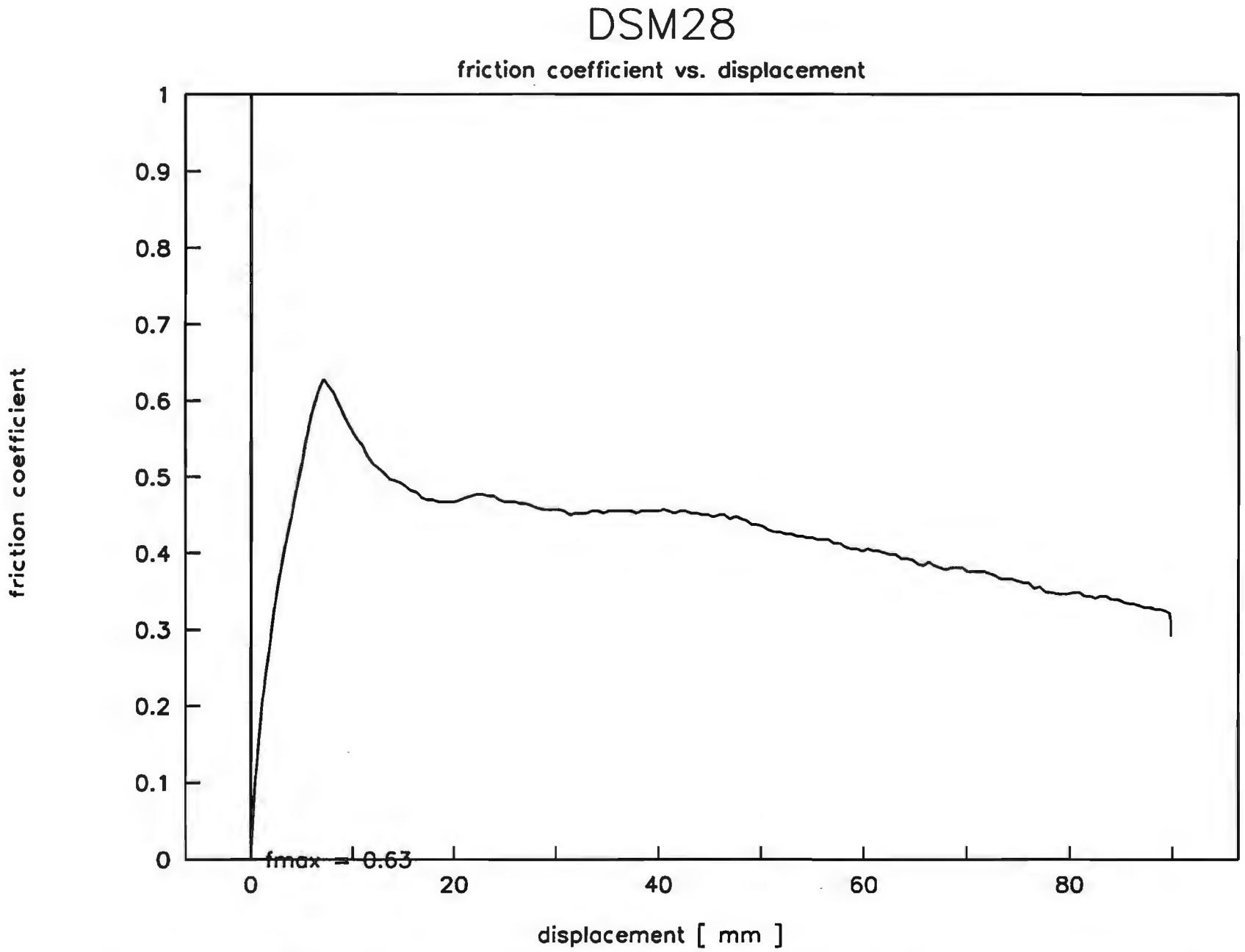

DSM21
friction coefficient vs. displacement
fmax = 0.66
friction coefficient
displocement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

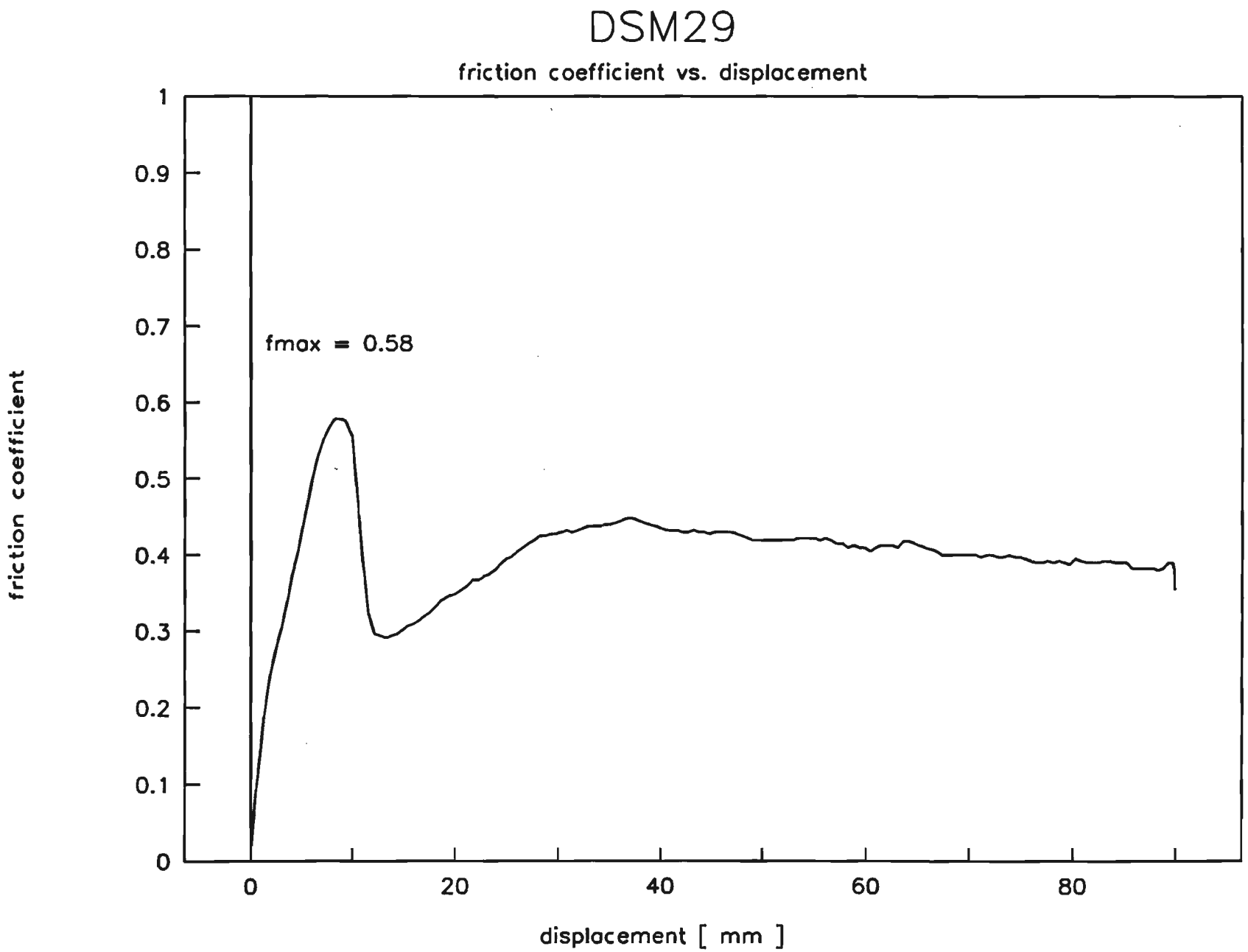

DSM23
friction coefficient vs. displacement
fmax = 0.61
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

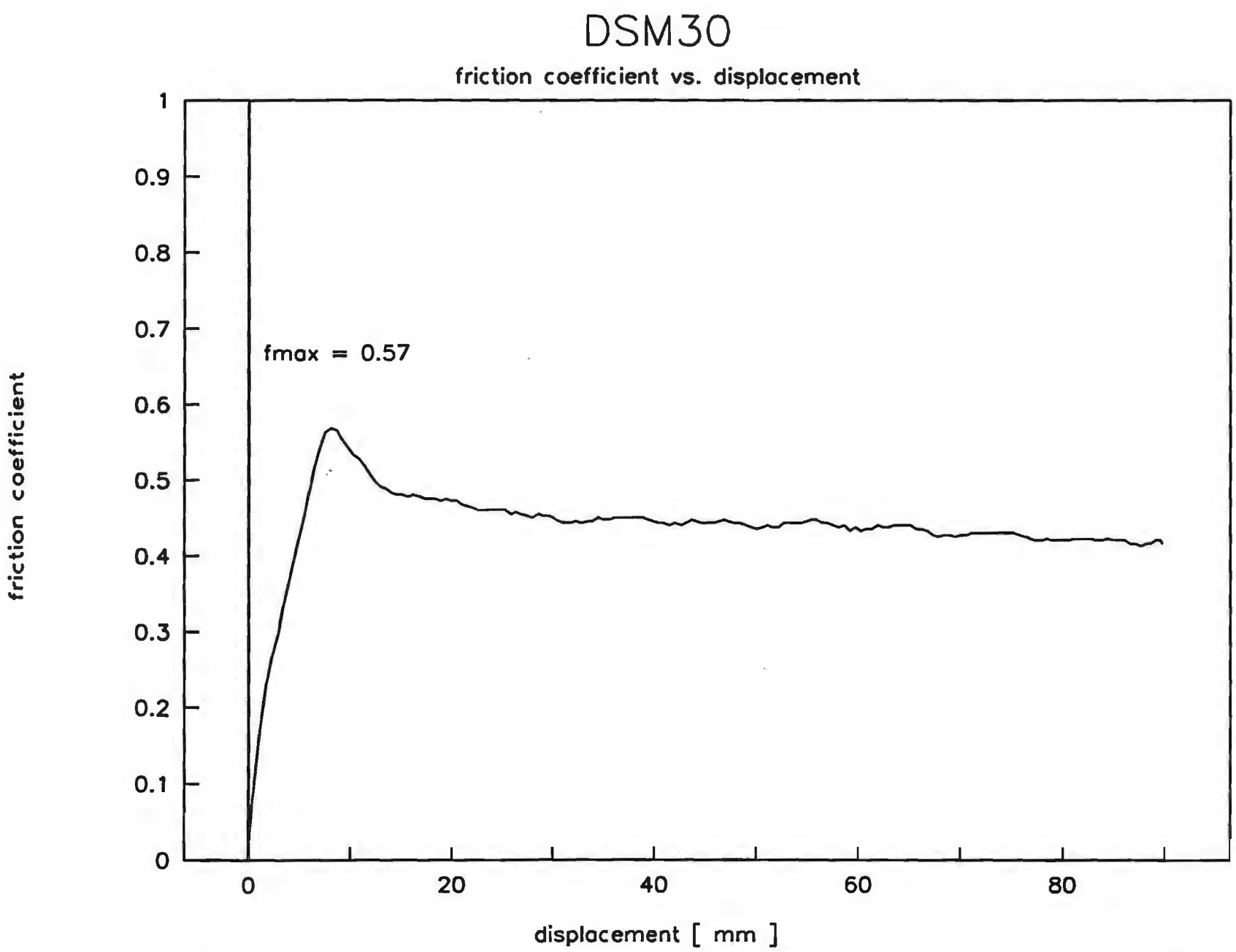

DSM25
friction coefficient vs. displacement
friction coefficient
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
fmax = 0.59
0
20
40
60
80
displacement [mm]

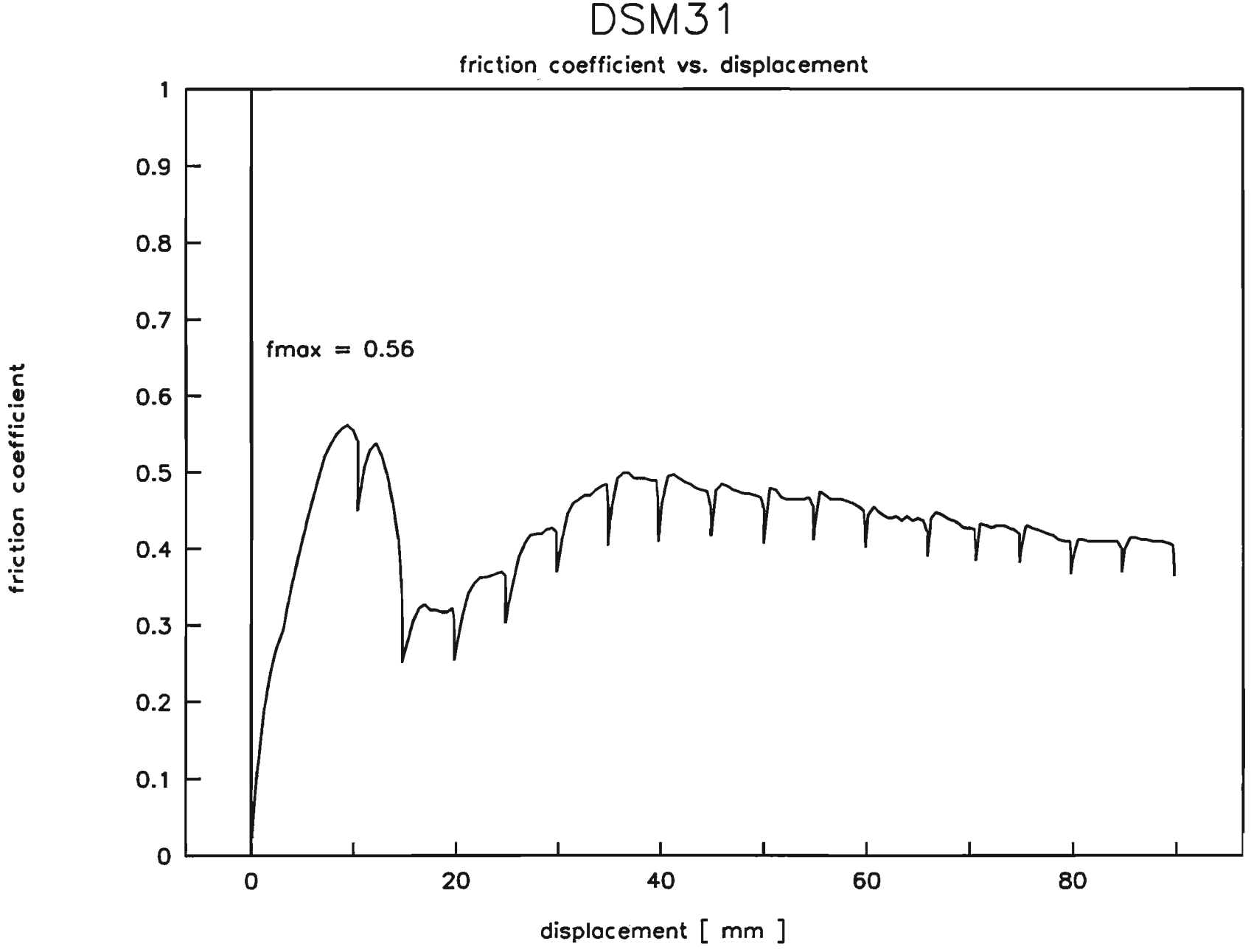

DSM26
friction coefficient vs. displacement
fmax = 0.62
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

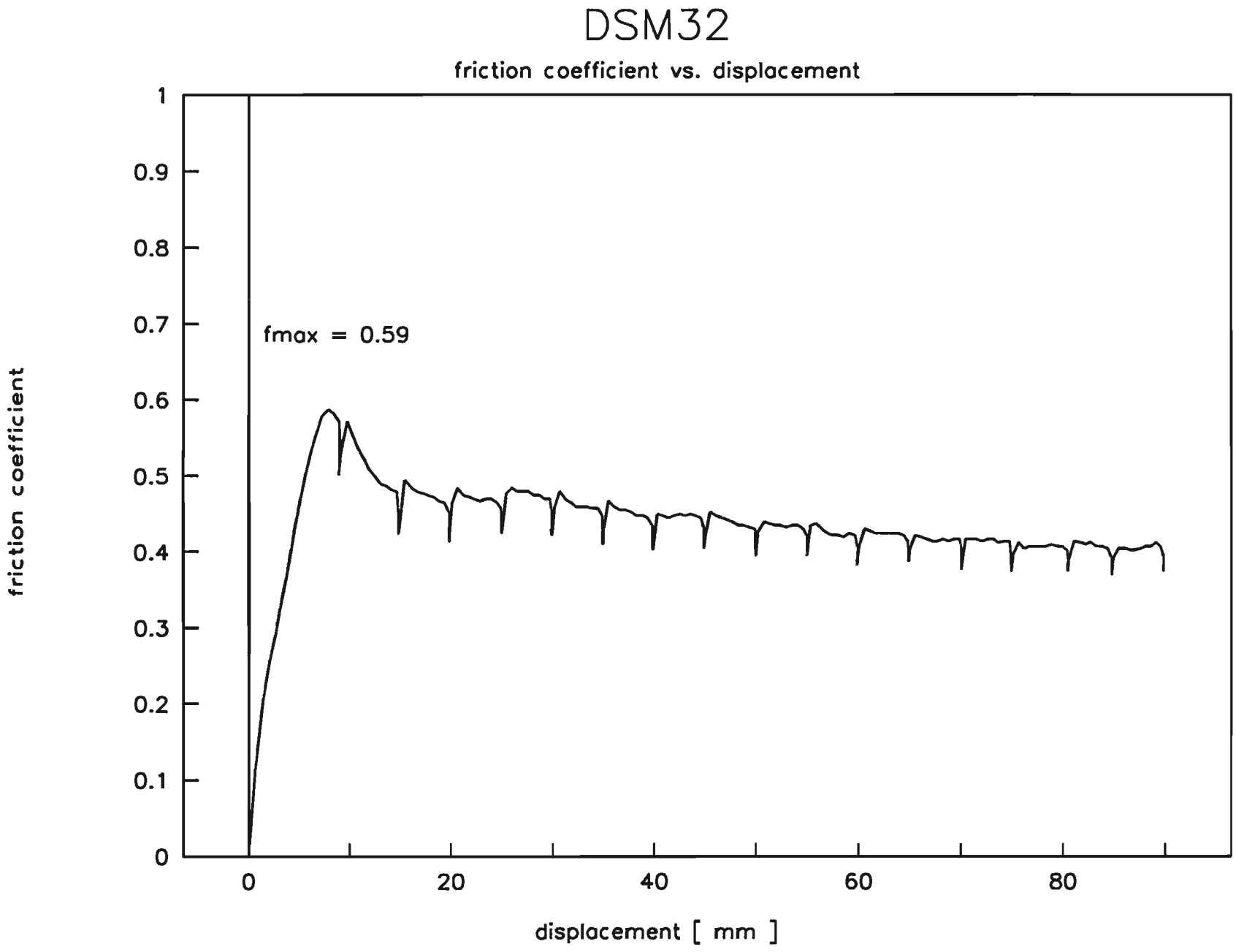

DSM27
friction coefficient vs. displacement
fmax = 0.61
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

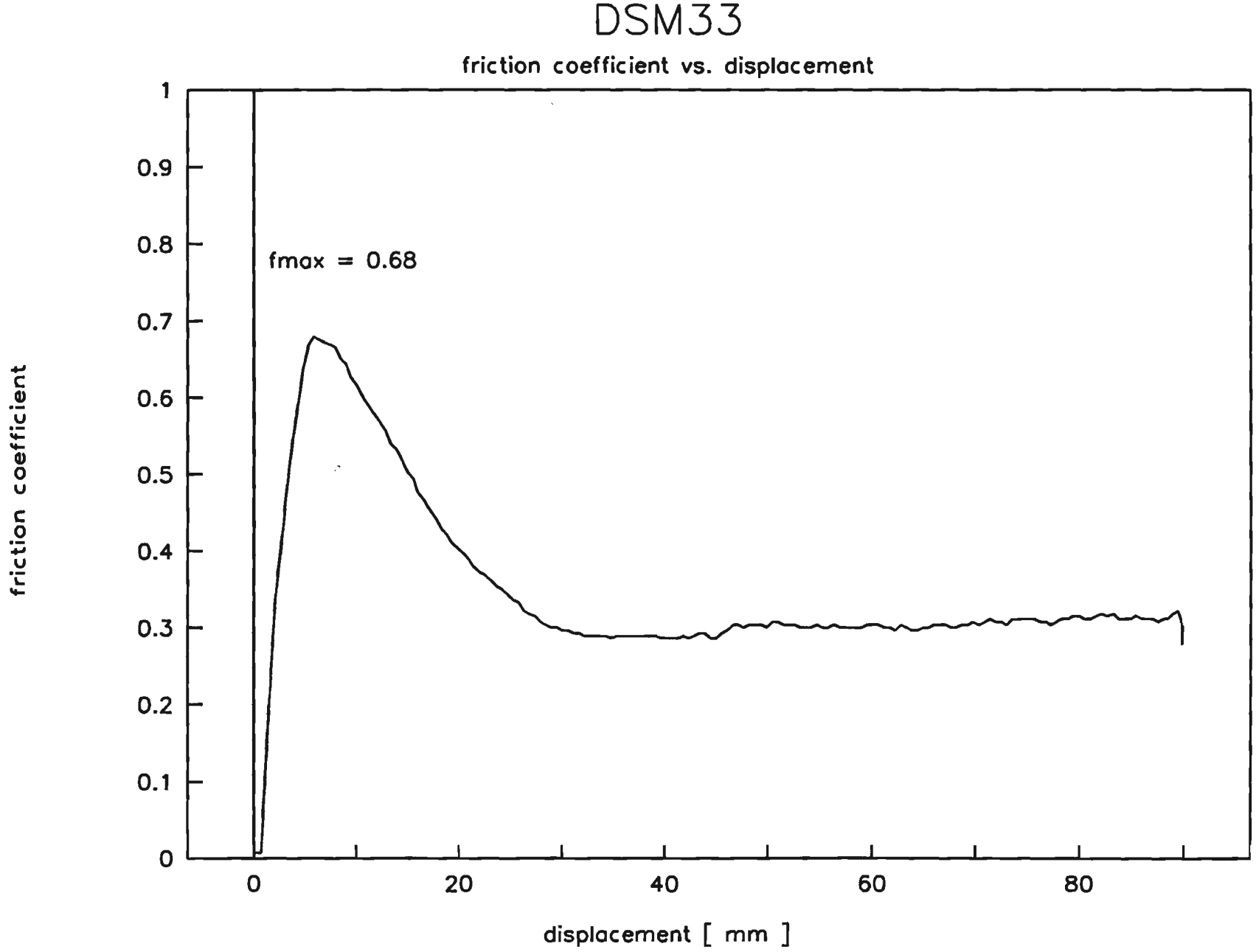

DSM28
friction coefficient vs. displacement
friction coefficient
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
fmax = 0.63
0
20
40
60
80
displacement [mm]

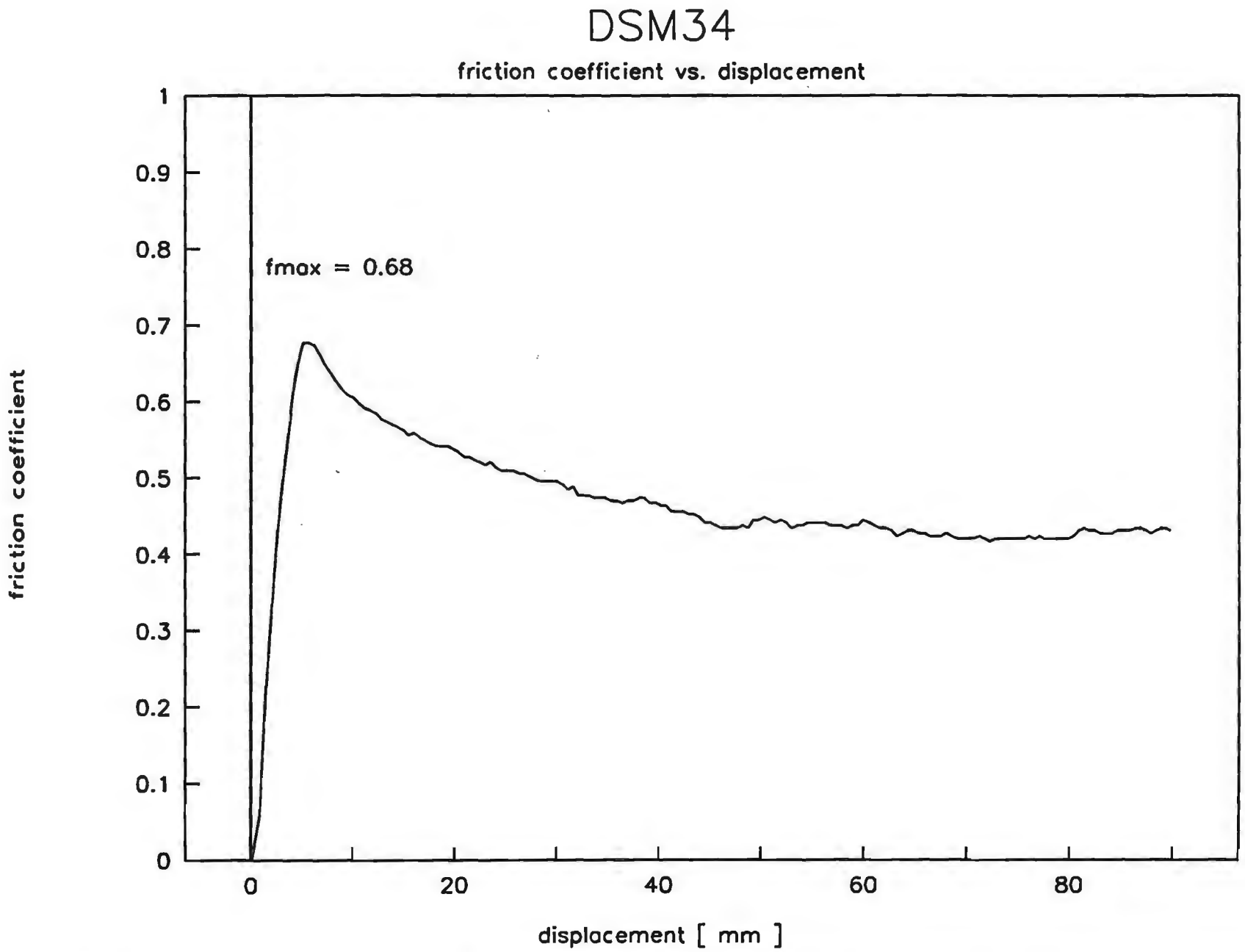

DSM29
friction coefficient vs. displacement
fmax = 0.58
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80


DSM30
friction coefficient vs. displacement
fmax = 0.57
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80


DSM31
friction coefficient vs. displacement
fmax = 0.56
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80


DSM32
friction coefficient vs. displacement
fmax = 0.59
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80


DSM33
friction coefficient vs. displacement
fmax = 0.68
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80


DSM34
friction coefficient vs. displacement
fmax = 0.68
friction coefficient
displacement [mm]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
20
40
60
80

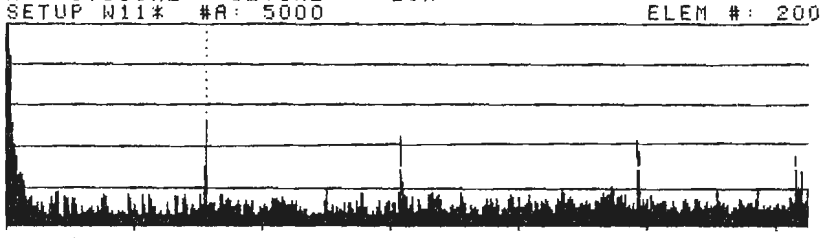
APPENDIX 3

Traffic-induced ground acceleration, experimental data (Table 4.1)

1

W11 AUTO SPEC CH.A
Y: 200µV RMS LIN
X: 0.000Hz + 12.5Hz LIN
SETUP W11* #A: 5000

MAIN Y: 105µV
X: 3.125Hz
ELEM #: 200



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: LIN 5000 OVERLAP: MAX

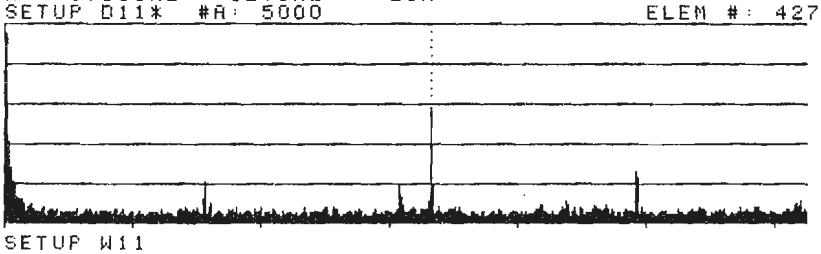
FREQ SPAN: 12.5Hz ΔF:15.6mHz T:64s ΔT:31.3ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 30mV + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: RANDOM NOISE OFF

2

W11 AUTO SPEC CH.A [ ] INPUT
Y: 400µV RMS LIN
X: 0.000Hz + 12.5Hz LIN
SETUP D11* #A: 5000

MAIN Y: 231µV
X: 6.671Hz
ELEM #: 427



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: LIN 5000 OVERLAP: MAX

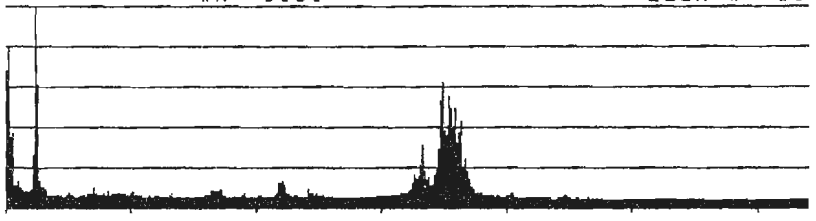
FREQ SPAN: 12.5Hz ΔF:15.6mHz T:64s ΔT:31.3ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 30mV + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: RANDOM NOISE

3

W11 AUTO SPEC CH.A
Y: 416µV RMS LIN
X: 0Hz + 3.2kHz LIN
#A: 5000

MAIN Y: 506µV
X: 124Hz
ELEM #: 31



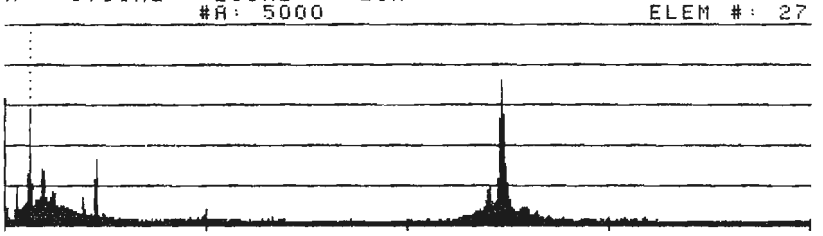
SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: LIN 5000 OVERLAP: MAX

4

W11 AUTO SPEC CH.A [ ] INPUT MAIN Y: 243uV
Y: 416uV RMS LIN X: 6.75Hz
X: 0.00Hz + 200Hz LIN
#A: 5000 ELEM #: 27



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

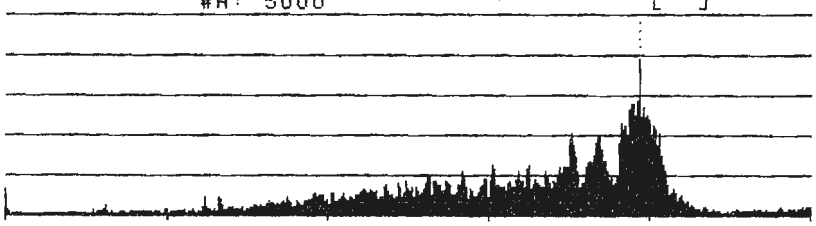
AVERAGING: LIN 5000 OVERLAP: MAX

FREQ SPAN: 200Hz ΔF:250mHz T:4s ΔT:1.95ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 30mV + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: RANDOM NOISE OFF

5

W18 AUTO SPEC CH.A MAIN Y: 2.24mV
Y: 2.85mV RMS LIN X: 19.718Hz
X: 0.000Hz + 25Hz LIN
#A: 5000 [ ]



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: PEAK 5000 OVERLAP: MAX

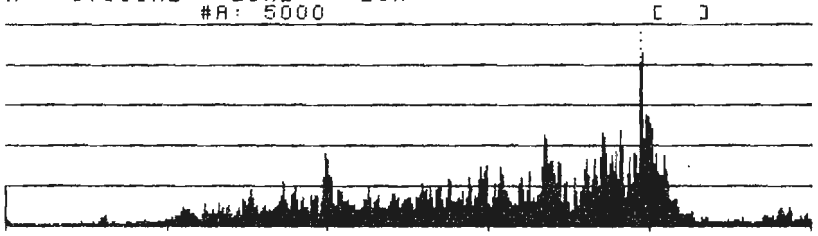
FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

5000

6

W18 AUTO SPEC CH.A MAIN Y: 2.31mV
Y: 2.85mV RMS LIN X: 19.718Hz
X: 0.000Hz + 25Hz LIN
#A: 5000 [ ]



SETUP W11

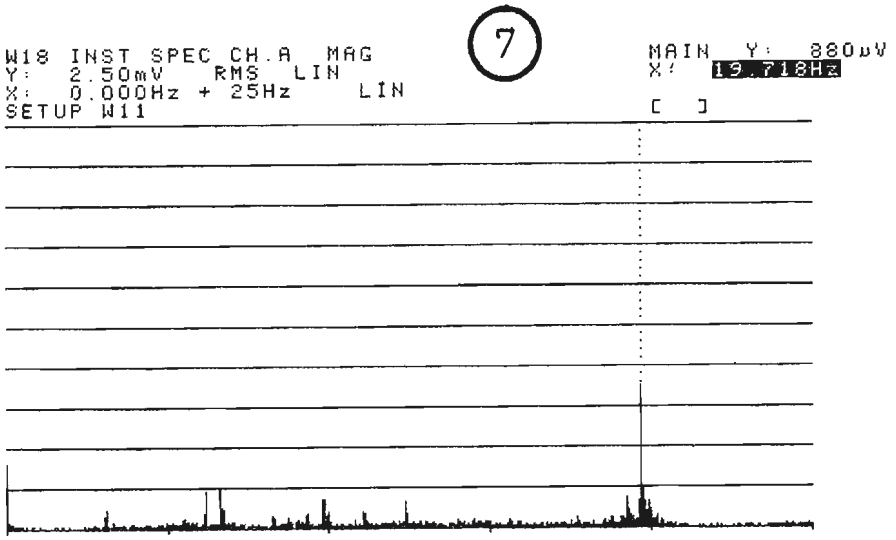
MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: PEAK 5000 OVERLAP: MAX

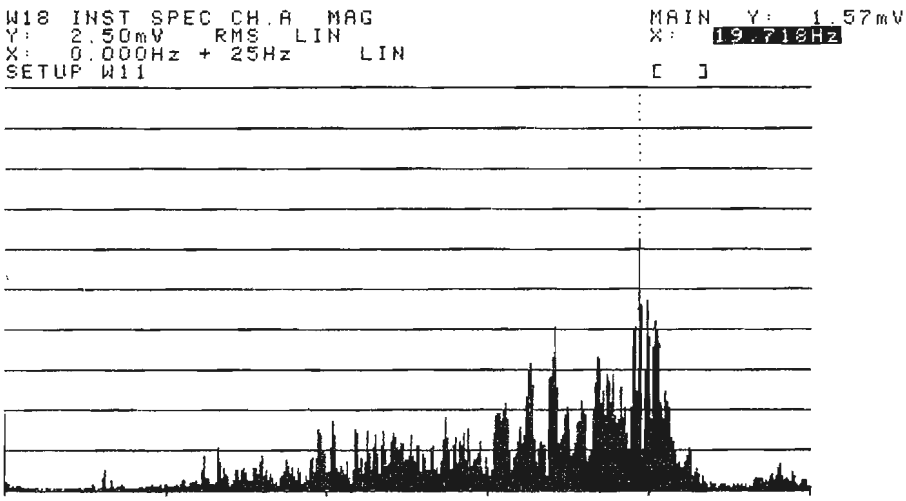
FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

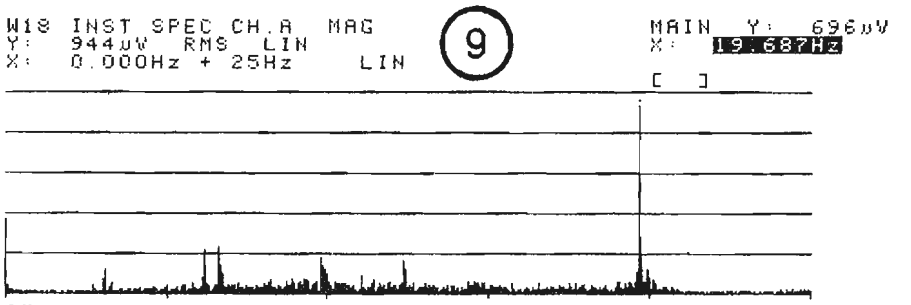
7



8



9

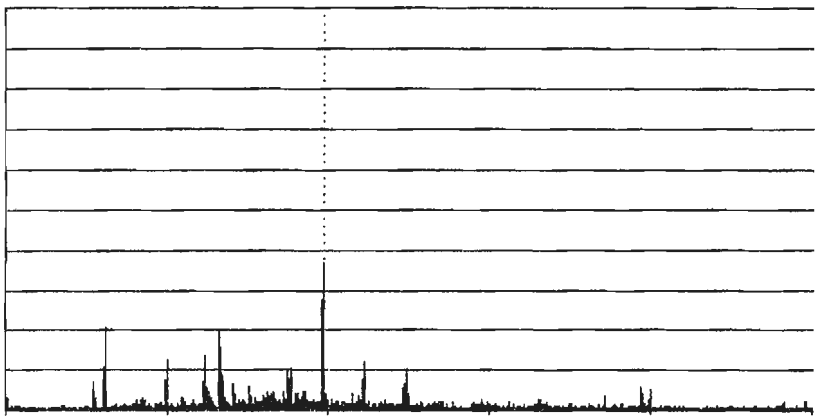


SETUP W11

MEASUREMENT:	CH.A SPECTRUM AVERAGING			
TRIGGER:	FREE RUN			
AVERAGING:	PEAK 100	OVERLAP: MAX		
FREQ SPAN:	25Hz	ΔF:31.3mHz	T:32s	ΔT:15.6ms
CENTER FREQ:	BASEBAND			
WEIGHTING:	HANNING			
CH.A:	2V +	3Hz DIR	FILT:25.6kHz	1V/V
CH.B:	2V +	3Hz DIR	FILT:25.6kHz	1V/V
GENERATOR:	DISABLED			

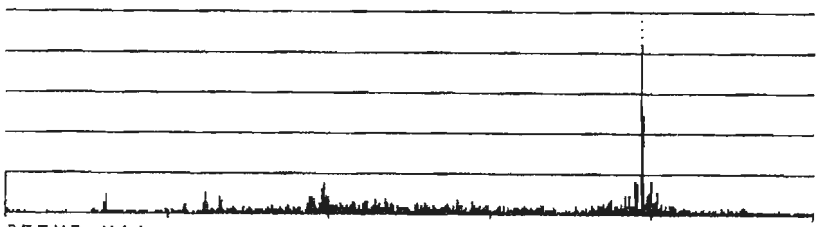
10

W18 INST SPEC CH.A MAG INPUT MAIN Y: 494µV
Y: 1.34mV RMS LIN X: 9.875Hz
X: 0.000Hz + 25Hz LIN
SETUP D11*



11

W18 INST SPEC CH.A MAG MAIN Y: 1.66mV
Y: 2.00mV RMS LIN X: 19.718Hz
X: 0.000Hz + 25Hz LIN



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

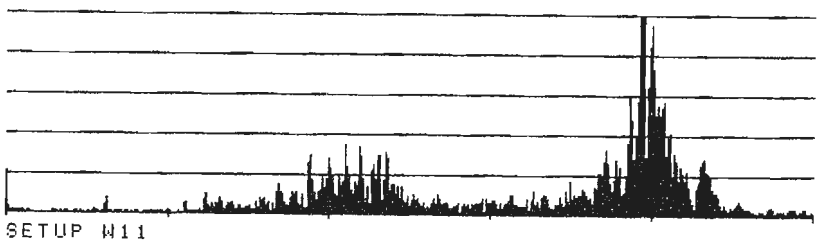
AVERAGING: LIN 100 OVERLAP: MAX

FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

12

W18 INST SPEC CH.A MAG MAIN Y: 3.43mV
Y: 2.00mV RMS LIN X: 19.718Hz
X: 0.000Hz + 25Hz LIN



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: LIN 100 OVERLAP: MAX

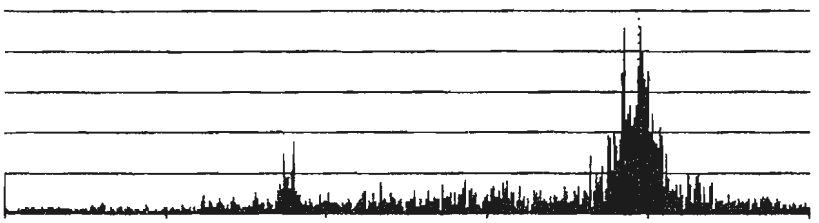
FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

W18 INST SPEC CH.A MAG
Y: 2.50mV RMS LIN
X: 0.000Hz + 25Hz LIN

13

MAIN Y: 1.46mV
X: 19.718Hz



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: LIN 100 OVERLAP: MAX

FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

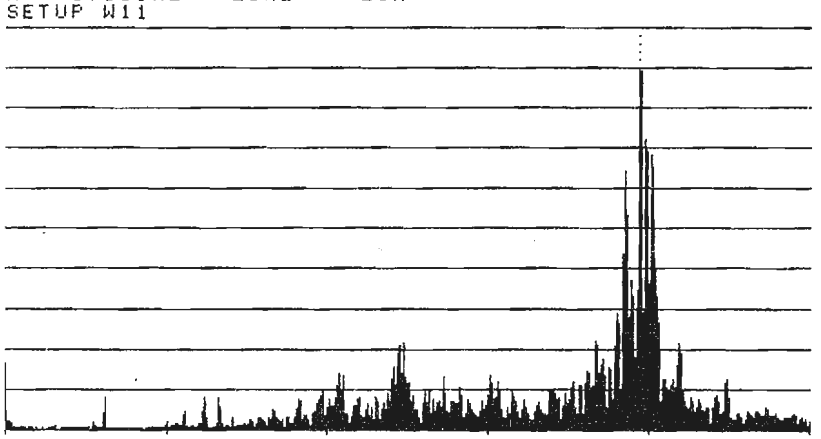
CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

W18 INST SPEC CH.A MAG
Y: 2.50mV RMS LIN
X: 0.000Hz + 25Hz LIN
SETUP W11

14

INPUT

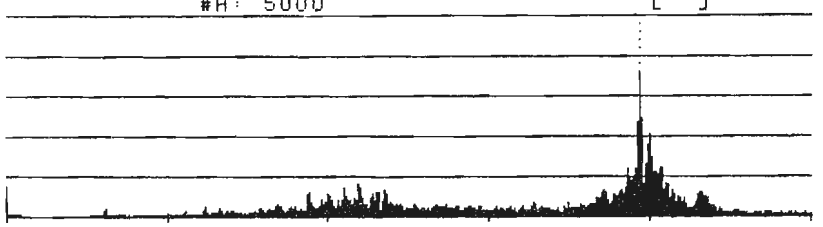
MAIN Y: 2.24mV
X: 19.718Hz



W18 AUTO SPEC CH.A
Y: 5.00mV RMS LIN
X: 0.000Hz + 25Hz LIN
#A: 5000

15

MAIN Y: 3.62mV
X: 19.718Hz
[ ]



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: PEAK 5000 OVERLAP: MAX

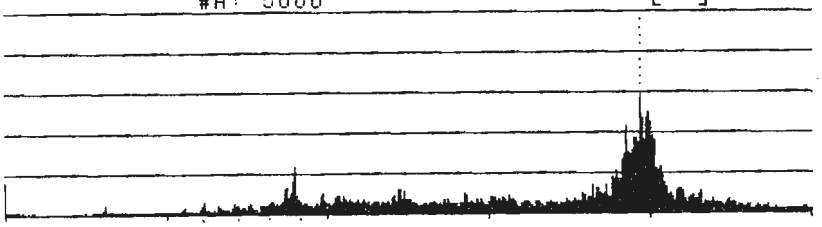
FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

W18 AUTO SPEC CH.A
Y: 5.00mV RMS LIN
X: 0.000Hz + 25Hz LIN
#A: 5000

16

MAIN Y: 2.93mV
X: 19.718Hz
[ ]



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: PEAK 5000 OVERLAP: MAX

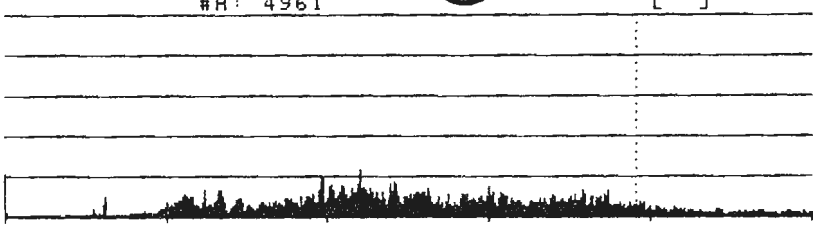
FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

W18 AUTO SPEC CH.A
Y: 2.85mV RMS LIN
X: 0.000Hz + 25Hz LIN
#A: 4961

17

MAIN Y: 163µV
X: 19.593Hz
[ ]



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: PEAK 5000 OVERLAP: MAX

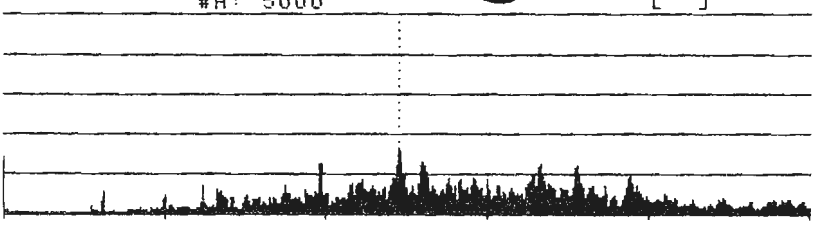
FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

W18 AUTO SPEC CH.A
Y: 2.50mV RMS LIN
X: 0.000Hz + 25Hz LIN
#A: 5000

18

MAIN Y: 825µV
X: 12.281Hz
[ ]



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: PEAK 5000 OVERLAP: MAX

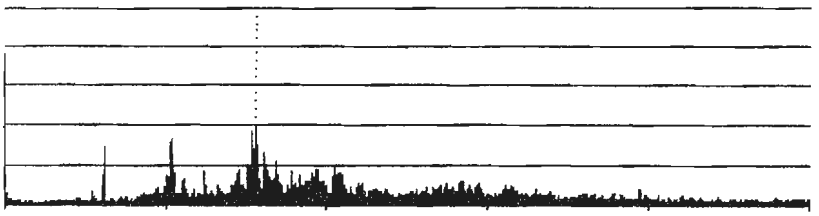
FREQ SPAN: 25Hz ΔF:31.3mHz T:32s ΔT:15.6ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: DISABLED

W18 AUTO SPEC CH.A
Y: 1.00mV RMS LIN
X: 0.000Hz + 25Hz LIN
#A: 5000

19

MAIN Y: 393µV
X: 1.943Hz
[ ]



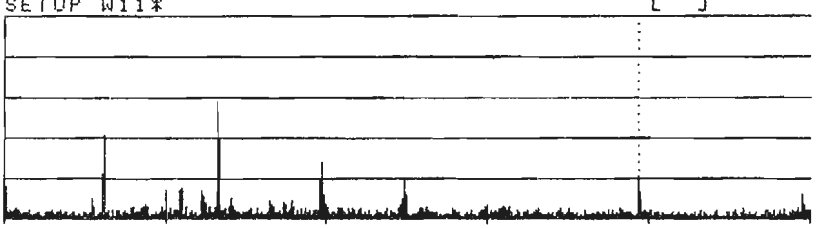
SETUP W11

MEASUREMENT:	CH.A SPECTRUM AVERAGING					
TRIGGER:	FREE RUN					
AVERAGING:	PEAK 5000		OVERLAP: MAX			
FREQ SPAN:	25Hz	ΔF:31.3mHz	T:32s	ΔT:15.6ms		
CENTER FREQ:	BASEBAND					
WEIGHTING:	HANNING					
CH.A:	2V	+	3Hz DIR	FILT:25.6kHz	1V/V	
CH.B:	2V	+	3Hz DIR	FILT:25.6kHz	1V/V	
GENERATOR:	DISABLED					

W18 INST SPEC CH.A MAG
Y: 224µV RMS LIN
X: 0.000Hz + 25Hz LIN
SETUP W11*

20

MAIN Y: 45.2µV
X: 19.718Hz
[ ]



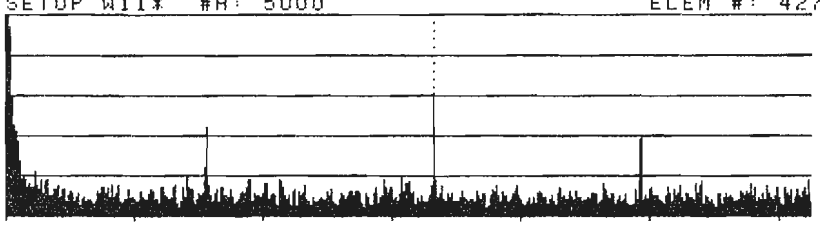
SETUP W11

MEASUREMENT:	CH.A SPECTRUM AVERAGING					
TRIGGER:	FREE RUN					
AVERAGING:	PEAK 200		OVERLAP: MAX			
FREQ SPAN:	25Hz	ΔF:31.3mHz	T:32s	ΔT:15.6ms		
CENTER FREQ:	BASEBAND					
WEIGHTING:	HANNING					
CH.A:	2V	+	3Hz DIR	FILT:25.6kHz	1V/V	
CH.B:	2V	+	3Hz DIR	FILT:25.6kHz	1V/V	
GENERATOR:	DISABLED					

W11 AUTO SPEC CH.A
Y: 200µV RMS LIN
X: 0.000Hz + 12.5Hz LIN
SETUP W11* #A: 5000

21

MAIN Y: 121µV
X: 5.671Hz
ELEM #: 427



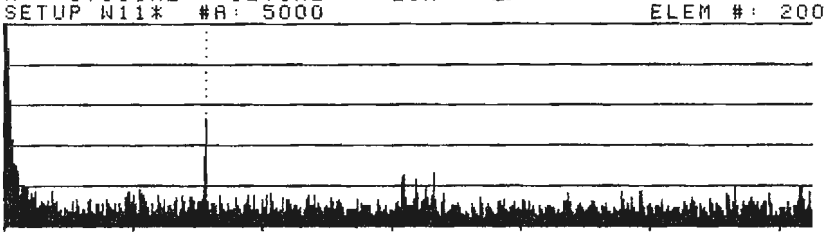
SETUP W11

MEASUREMENT:	CH.A SPECTRUM AVERAGING					
TRIGGER:	FREE RUN					
AVERAGING:	LIN 5000		OVERLAP: MAX			
FREQ SPAN:	12.5Hz	ΔF:15.6mHz	T:64s	ΔT:31.3ms		
CENTER FREQ:	BASEBAND					
WEIGHTING:	HANNING					
CH.A:	2V	+	3Hz DIR	FILT:25.6kHz	1V/V	
CH.B:	30mV	+	3Hz DIR	FILT:25.6kHz	1V/V	
GENERATOR:	RANDOM NOISE			OFF		

W11 AUTO SPEC CH.A
Y: 200µV RMS LIN
X: 0.000Hz + 12.5Hz LIN
SETUP W11* #A: 5000

22

MAIN Y: 105µV
X: 3.125Hz
ELEM #: 200



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: LIN 5000 OVERLAP: MAX

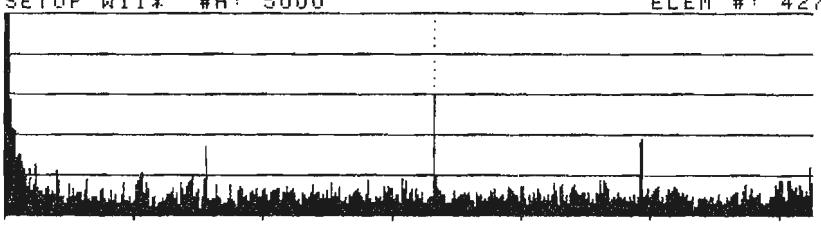
FREQ SPAN: 12.5Hz ΔF:15.6mHz T:64s ΔT:31.3ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 30mV + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: RANDOM NOISE OFF

W11 AUTO SPEC CH.A
Y: 200µV RMS LIN
X: 0.000Hz + 12.5Hz LIN
SETUP W11* #A: 5000

23

MAIN Y: 120µV
X: 6.671Hz
ELEM #: 427



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

AVERAGING: LIN 5000 OVERLAP: MAX

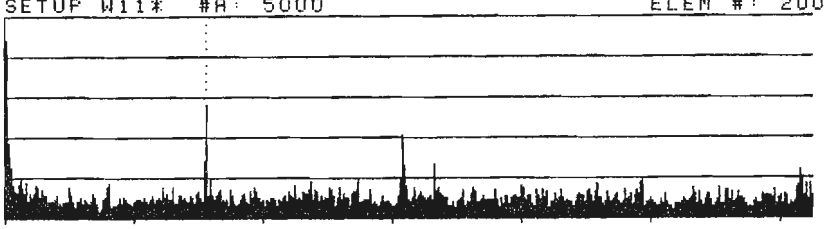
FREQ SPAN: 12.5Hz ΔF:15.6mHz T:64s ΔT:31.3ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 30mV + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: RANDOM NOISE OFF

W11 AUTO SPEC CH.A
Y: 200µV RMS LIN
X: 0.000Hz + 12.5Hz LIN
SETUP W11* #A: 5000

24

MAIN Y: 110µV
X: 3.125Hz
ELEM #: 200



SETUP W11

MEASUREMENT: CH.A SPECTRUM AVERAGING
TRIGGER: FREE RUN

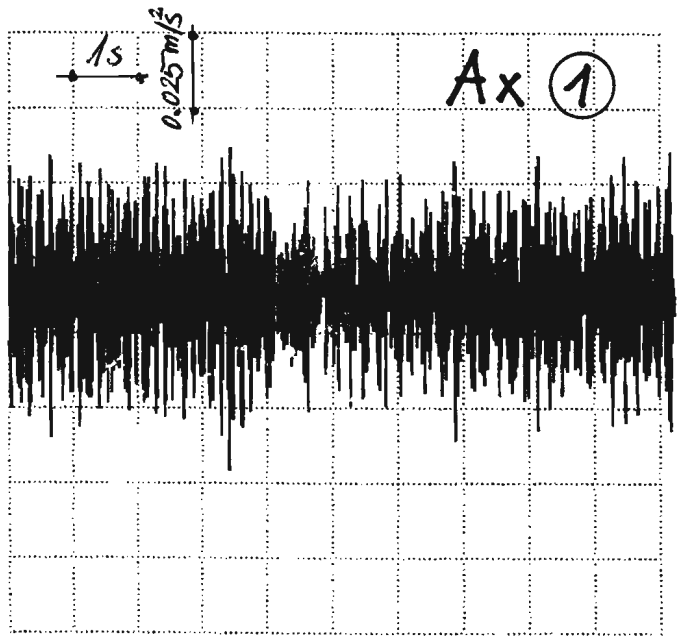
AVERAGING: LIN 5000 OVERLAP: MAX

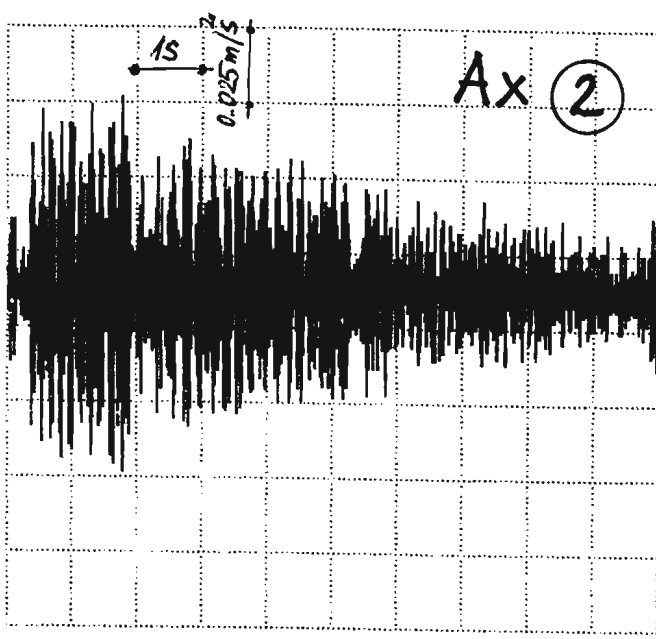
FREQ SPAN: 12.5Hz ΔF:15.6mHz T:64s ΔT:31.3ms
CENTER FREQ: BASEBAND
WEIGHTING: HANNING

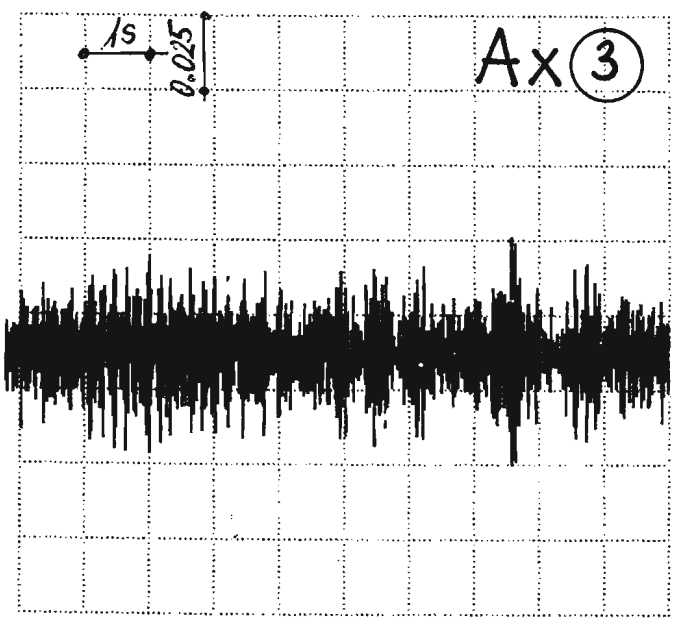
CH.A: 2V + 3Hz DIR FILT:25.6kHz 1V/V
CH.B: 2V + 3Hz DIR FILT:25.6kHz 1V/V
GENERATOR: RANDOM NOISE OFF

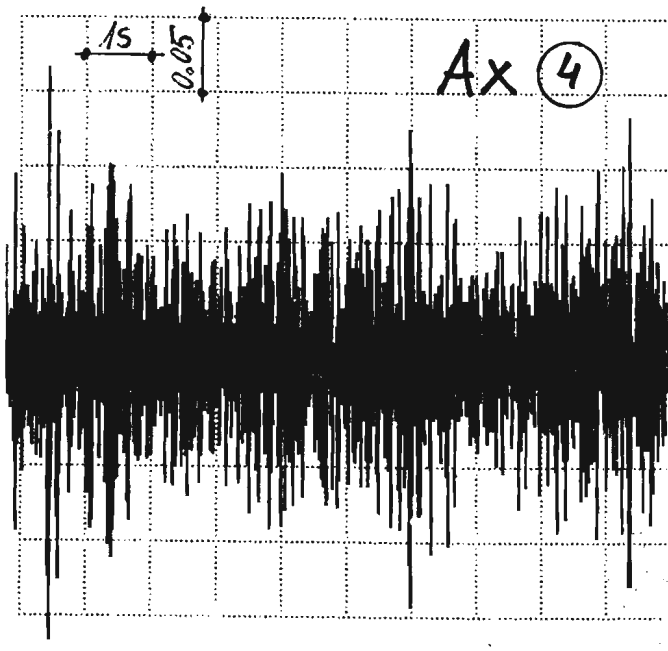
APPENDIX 4

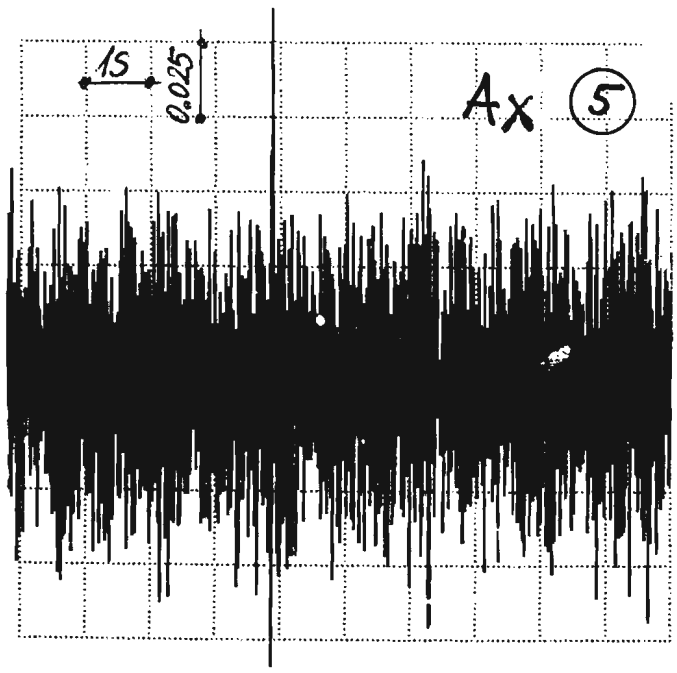
Crane-induced ground accelerations, experimental data (Table 5.3.)

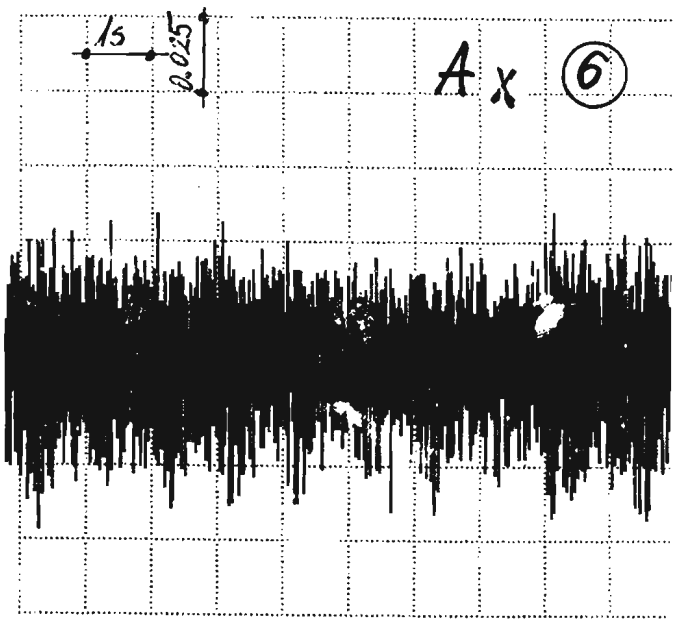

1s
0.025 m/s²
Ax 1

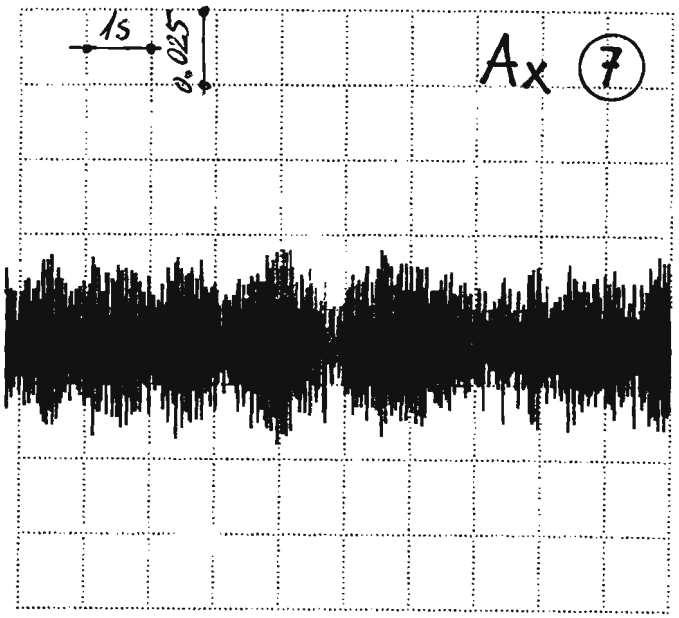

1s
0.025 m/s²
Ax 2

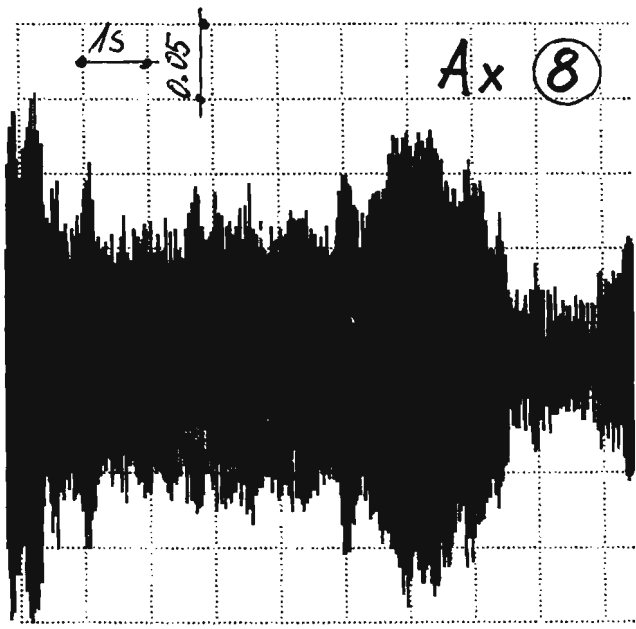

1s
0.025
Ax 3

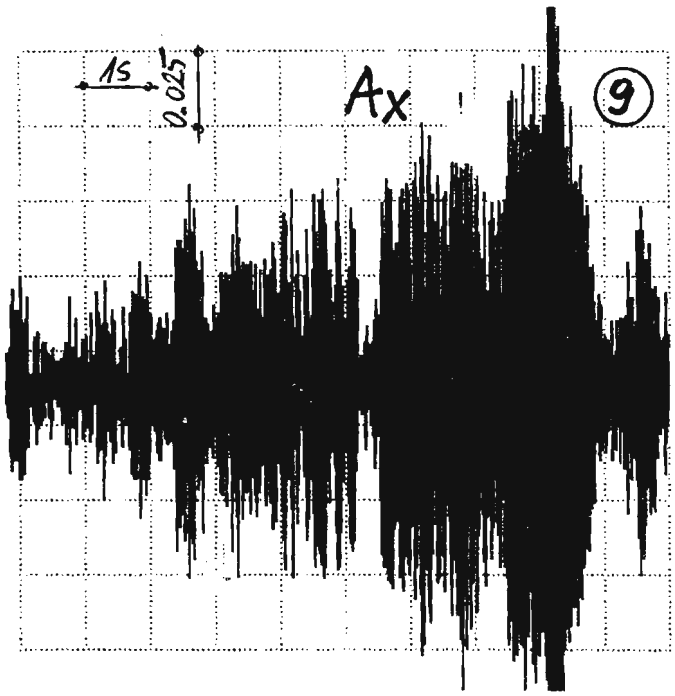

1s
0.05
Ax 4

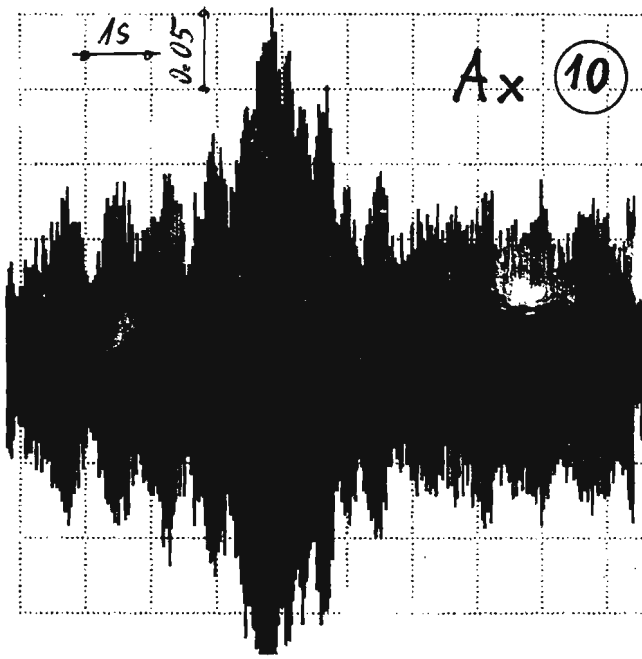

1s
0.025
Ax 5

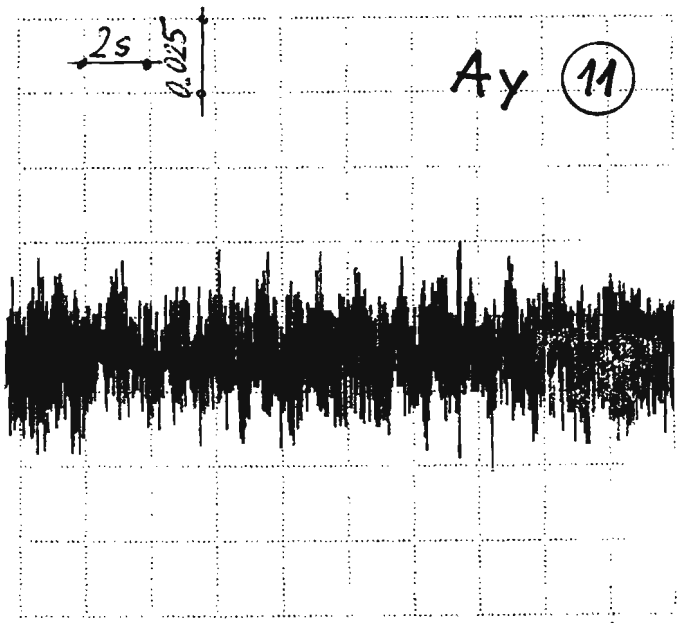

1s
0.025
Ax 6

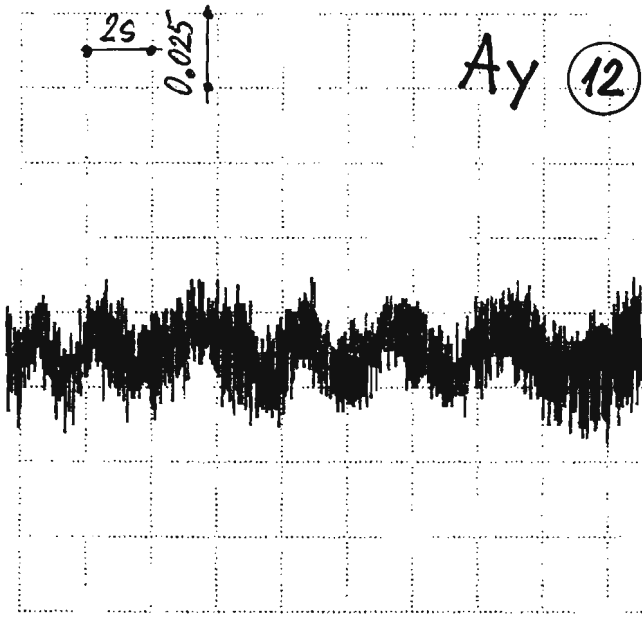

1s
0.025
Ax 7

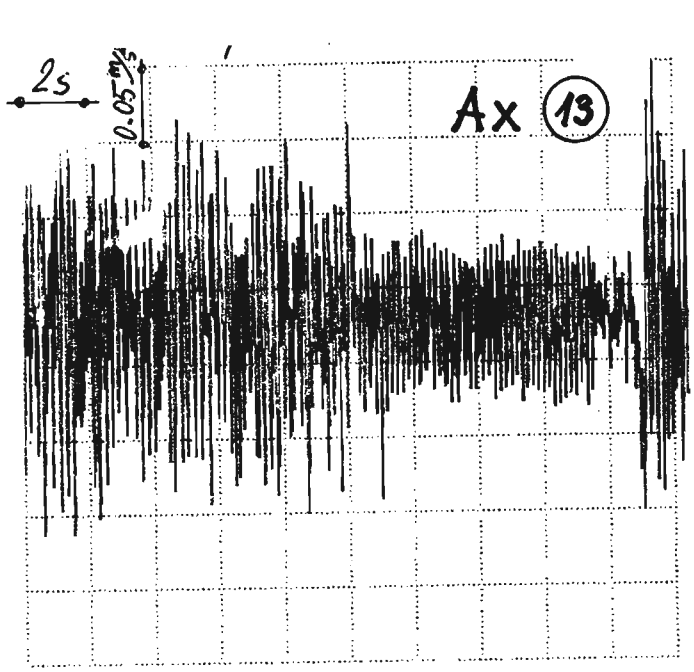

1s
0.05
Ax 8

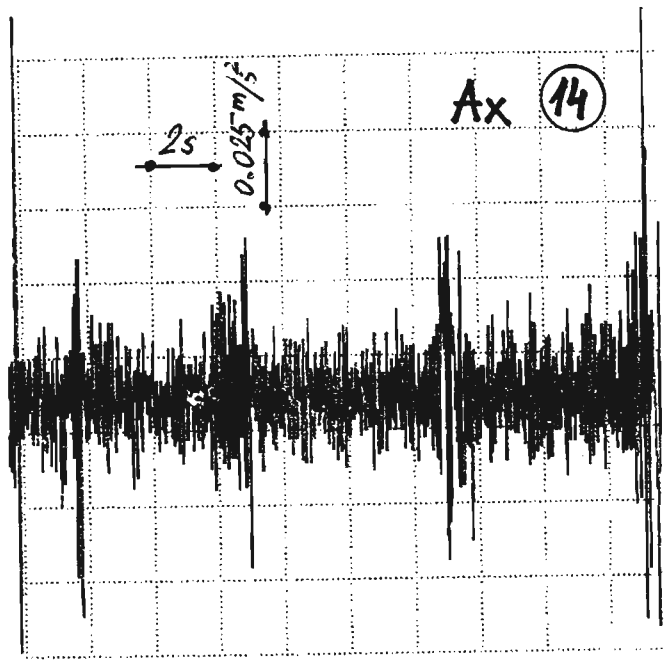

1s
0.025
Ax 9

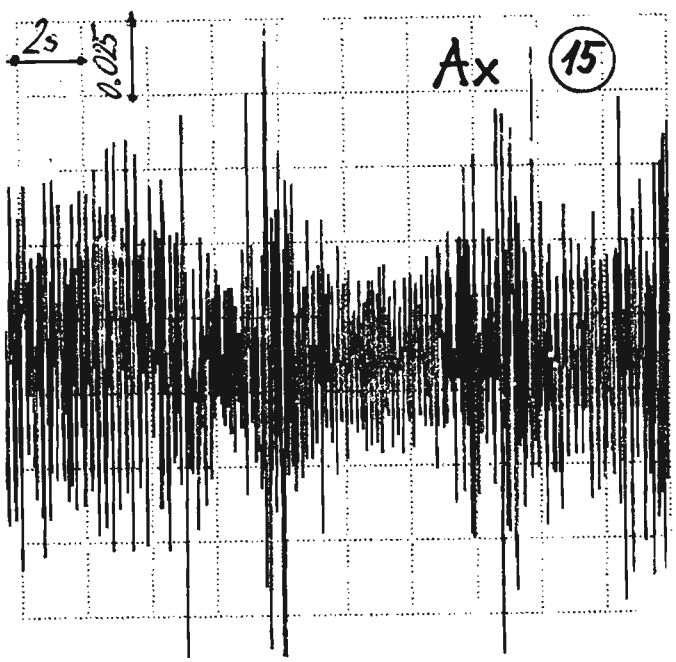

1s
0.05
Ax 10

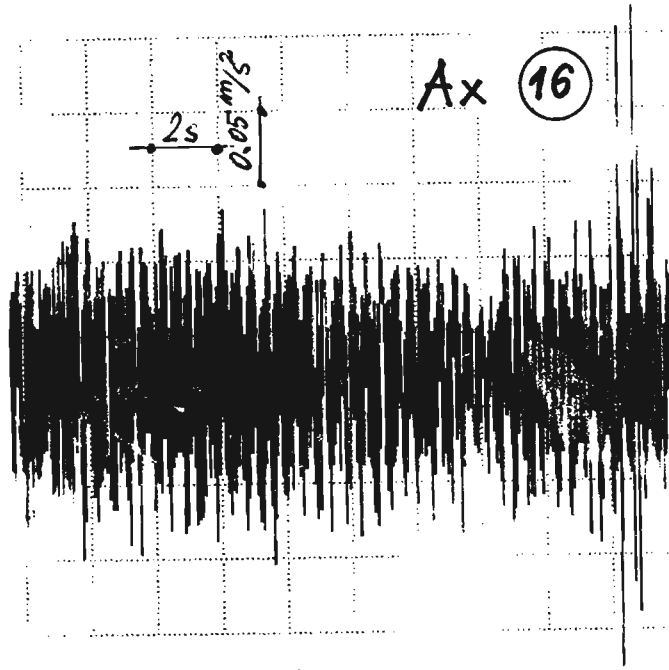

2s
0.025
Ay 11

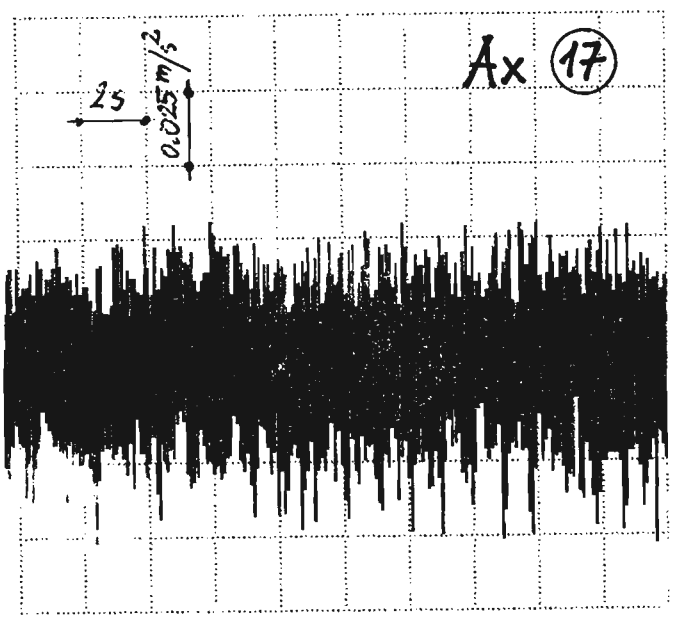

2s
0.025
Ay 12

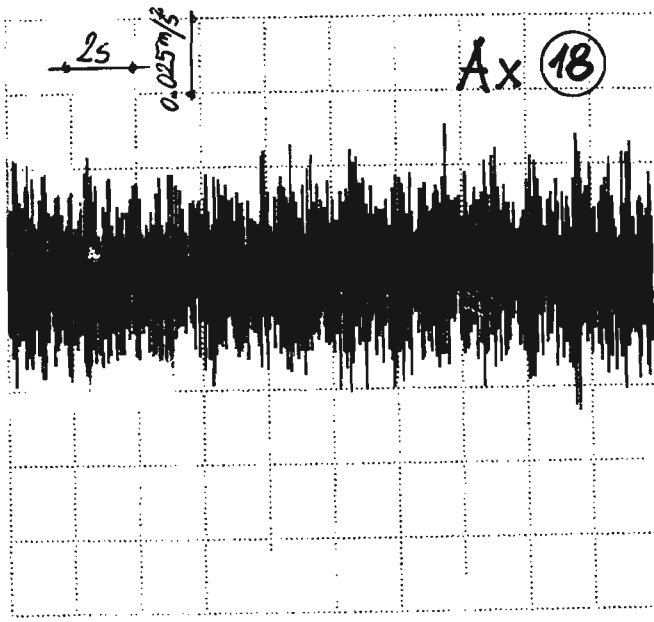

2s
0.05 m/s²
Ax 13

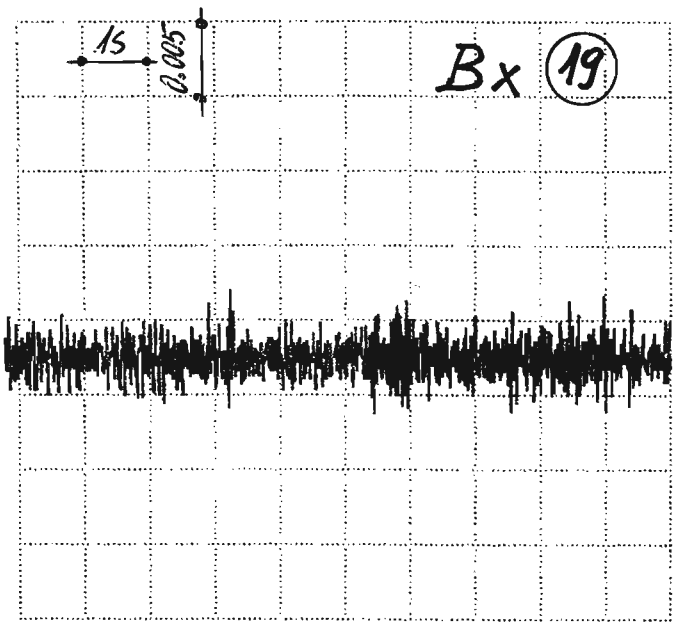

2s
0.025 m/s²
Ax 14

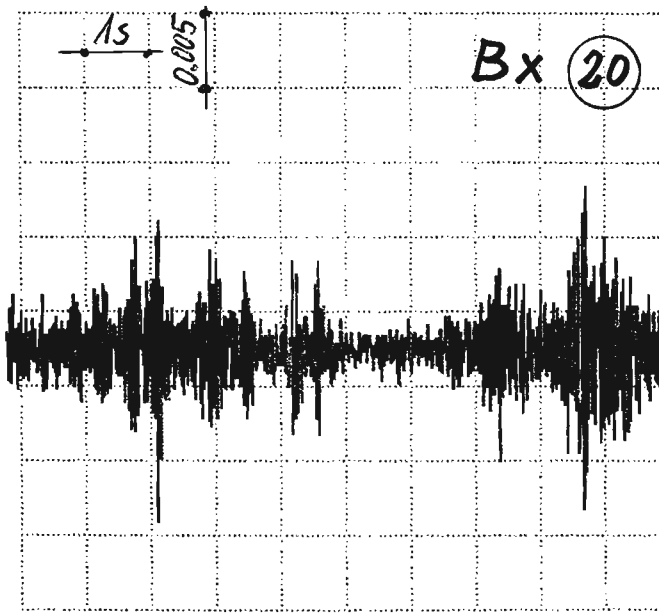

2s
0.025
Ax 15

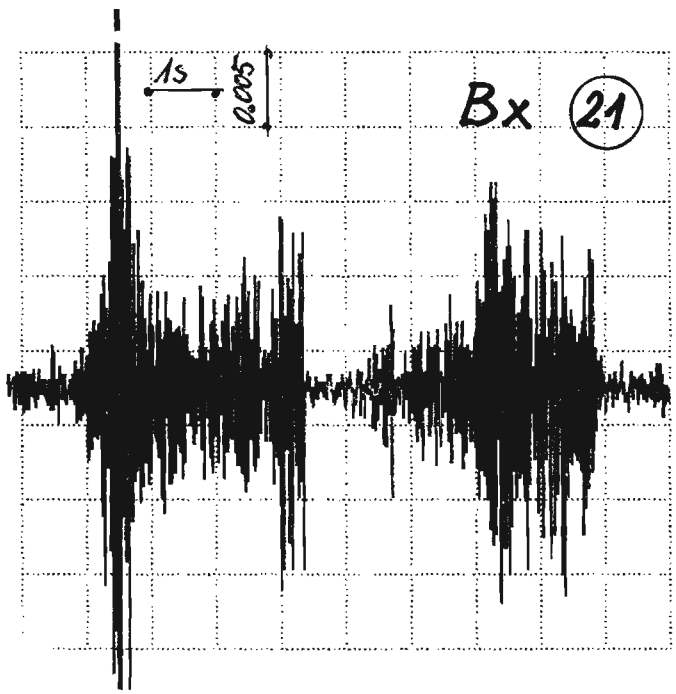

2s
0.05 m/s²
Ax 16

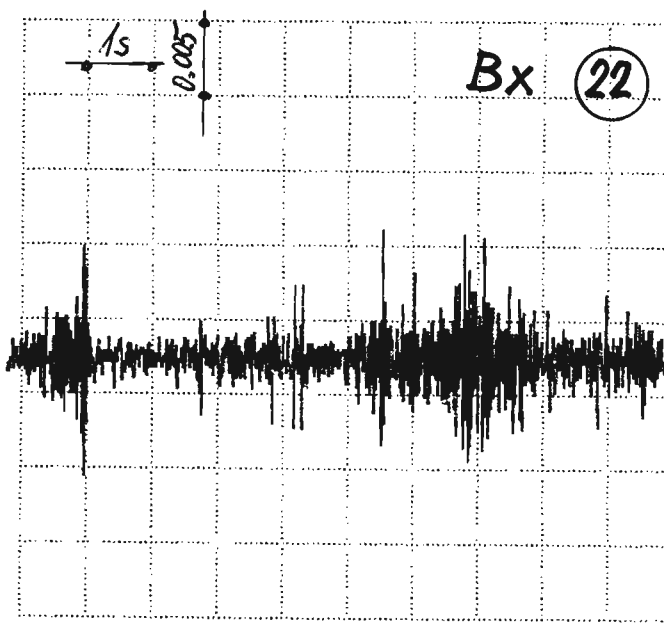

2s
0.025 m/s²
Ax 17

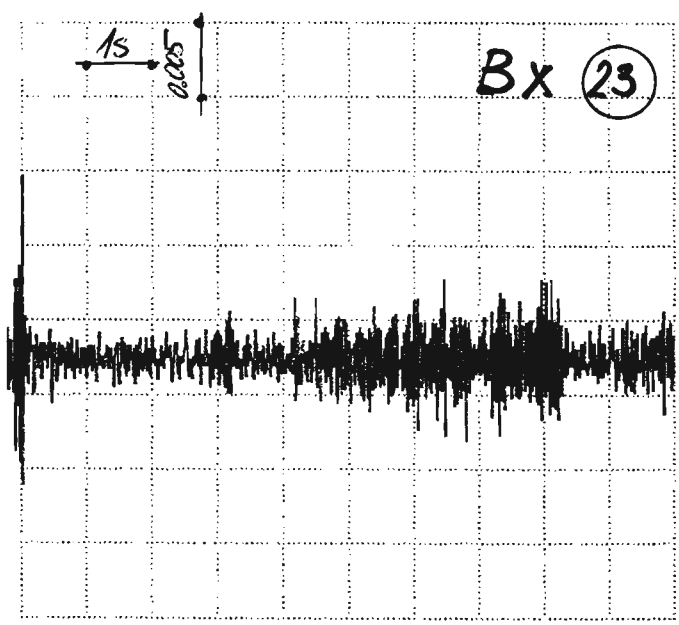

2s
0.025 m/s²
Ax 18

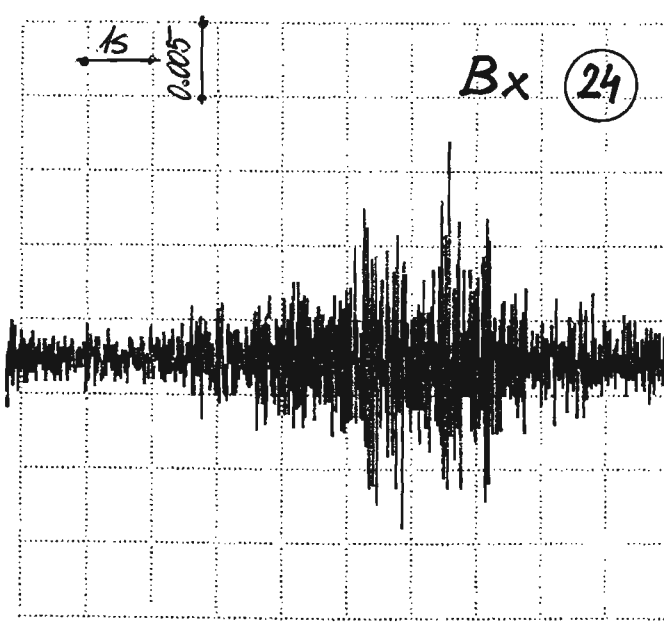

1s
0.005
Bx 19


1s
0.005
Bx 20


1s
0.005
Bx 21


1s
0.005
Bx 22


1s
0.005
Bx 23


1s
0.005
Bx 24

APPENDIX 5

Results of numerical calculations:

Dynamic loading 1 - traffic induced vibrations:

acceleration function $a_1(t) = 0.0004 \sin 2.6108t$ (out 11)

$a_2(t) = 0.00054 \sin 5.2216t$ (out 12)

$a_3(t) = 0.000924 \sin 7.8324t$ (out 13)

$a_4(t) = 0.00124 \sin 10.4432t$ (out 9)

$a_5(t) = 0.002 \sin 13.054t$ (out 8)

$a_6(t) = 0.0054 \sin 15.6621t$ (out 10)

Dynamic loading 2 - crane induced vibrations

2.1 - beating frequency 1 (out 1)

2.1 - beating frequency 2 (out 2)

2.2 - Fourier analysis (out 18)

Dynamic loading 3 - wind spectrum (out 21)

DYNAMIC LOADING 1 TRAFFIC INDUCED VIBRATIONS
AMPLITUDE 0.0004 FREQUENCY 2.6108

**** ACTIVE UNITS - LENGTH WEIGHT ANGLE TEMPERATURE TIME
**** ASSUMED TO BE INCH POUND RADIAN FAHRENHEIT SECOND

```
{    2} > units m n
{    3} > type space frame
{    4} > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

```
{    5} > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

```
{    6} > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

```
(    7) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
(    8) > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
(    9) > joints coordinates
(   10) > 36 3.6 3.8 39.6 F
(   11) > 37 3.6 0.0 39.6 S
(   12) > 38 7.2 3.8 0.0 F
(   13) > 39 7.2 3.8 39.6 F
(   14) > 40 7.2 0.0 0.0 S
(   15) > 41 7.2 0.0 39.6 S
(   16) > 42 10.8 3.8 39.6 F
(   17) > 43 10.8 0.0 39.6 S
(   18) > member incidences
(   19) > 'b1' 1 2
(   20) > 'b2' 2 3
(   21) > 'b3' 3 4
(   22) > 'b4' 4 5
(   23) > 'b5' 5 6
(   24) > 'b6' 6 7
(   25) > 'b7' 7 8
(   26) > 'b8' 8 9
(   27) > 'b9' 9 10
(   28) > 'b10' 10 11
(   29) > 'b11' 11 12
(   30) > 'b12' 12 13
(   31) > 'b13' 13 14
(   32) > 'b14' 14 15
(   33) > 'b15' 15 16
(   34) > 'b16' 16 17
(   35) > 'b17' 17 18
(   36) > 'b18' 18 19
(   37) > 'b19' 19 20
(   38) > member incidences
(   39) > 'b20' 20 21
(   40) > 'b21' 21 22
(   41) > 'b22' 22 23
(   42) > 'ba23'  1 38
(   43) > 'ba24' 38 44
(   44) > 'bb25'  2 45
(   45) > 'bb26'  3 46
(   46) > 'bb27'  4 47
(   47) > 'bb28'  5 48
(   48) > 'bb29'  6 49
(   49) > 'bb30'  7 50
(   50) > 'bb31'  8 51
(   51) > 'bb32'  9 52
(   52) > 'bb33' 10 53
(   53) > 'bb34' 11 54
(   54) > 'bb35' 12 55
(   55) > 'bb36' 13 56
(   56) > 'bb37' 14 57
(   57) > 'bb38' 15 58
(   58) > 'bb39' 16 59
(   59) > 'bb40' 17 60
(   60) > 'bb41' 18 61
(   61) > member incidences
(   62) > 'bb42' 19 62
(   63) > 'bb43' 20 63
(   64) > 'bb44' 21 64
(   65) > 'bb45' 22 65
(   66) > 'bc46' 23 36
(   67) > 'bc47' 36 39
(   68) > 'bc48' 39 42
(   69) > 'bc49' 42 66
(   70) > 'bd50' 44 45
(   71) > 'bd51' 45 46
(   72) > 'bd52' 46 47
(   73) > 'bd53' 47 48
(   74) > 'bd54' 48 49
(   75) > 'bd55' 49 50
(   76) > 'bd56' 50 51
```

```
(   77) > 'bd57' 51 52
(   78) > 'bd58' 52 53
(   79) > 'bd59' 53 54
(   80) > 'bd60' 54 55
(   81) > 'bd61' 55 56
(   82) > 'bd62' 56 57
(   83) > 'bd63' 57 58
(   84) > 'bd64' 58 59
(   85) > 'bd65' 59 60
(   86) > 'bd66' 60 61
(   87) > 'bd67' 61 62
(   88) > 'bd68' 62 63
(   89) > 'bd69' 63 64
(   90) > 'bd70' 64 65
(   91) > member incidences
(   92) > 'bd71' 65 66
(   93) > 's72'  24  1
(   94) > 's73'  25  3
(   95) > 's74'  26  5
(   96) > 's75'  27  7
(   97) > 's76'  28  9
(   98) > 's77'  29 11
(   99) > 's78'  30 13
(  100) > 's79'  31 15
(  101) > 's80'  32 17
(  102) > 's81'  33 19
(  103) > 's82'  34 21
(  104) > 's83'  35 23
(  105) > 's84'  37 36
(  106) > 's85'  40 38
(  107) > 's86'  41 39
(  108) > 's87'  43 42
(  109) > 's88'  67 44
(  110) > 's89'  68 46
(  111) > 's90'  69 48
(  112) > 's91'  70 50
(  113) > 's92'  71 52
(  114) > 's93'  72 54
(  115) > 's94'  73 56
(  116) > 's95'  74 58
(  117) > 's96'  75 60
(  118) > 's97'  76 62
(  119) > 's98'  77 64
(  120) > 's99'  78 66
(  121) >
(  121) > joint releases
(  122) > 25 to 34 kfx 1.15E7
(  123) > 68 to 77 kfx 1.15E7
(  124) > 40 37 41 43 kfz 1.15E7
(  125) > 1 for y for z mom x mom y mom z kfx  3.2574E6
(  126) > 3 for y for z mom x mom y mom z kfx 7.0822E5
(  127) > 5 for y for z mom x mom y mom z kfx 2.1247E6
(  128) > 11 for y for z mom x mom y mom z kfx 7.0822E5
(  129) > 17 for y for z mom x mom y mom z kfx 7.0822E5
(  130) > 19 for y for z mom x mom y mom z kfx 1.11225E6
(  131) > 44 for x for y mom x mom y mom z kfz 1.11225E6
(  132) > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
(  133) > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
(  134) >
(  134) > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
(  135) >
(  135) > member releases
(  136) > 'bb25' to 'bb45' start          moment x y z end moment y z
(  137) > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
(  138) > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
(  139) > 'ba23' 'ba24' start mom x y z end mom z y
(  140) > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
(  141) > member eccentricities
(  142) > 'bb25' to 'bb45' start x 0.15
(  143) > member properties prismatic
(  144) > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
(  145) > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
(  146) > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
(  147) > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
(  148) > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
(  149) > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  150) > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  151) > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
(  152) > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
(  153) > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
(  154) > material constants
(  155) > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
(  156) > material concrete 's85' 's80' 'bb25' to 'bb45'
(  157) > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
(  158) > material steel 'bd50' to 'bd71'
(  159) > constants beta 0.0 all
(  160) > dead load 'dl' direction -y all members
(  161) > damping percents 2.5 50
```

```
(  162) > inertia of joints lumped
(  163) > dynamic degrees of freedom with static condensation
(  164) > generate  70 from joints translations x
(  165) >
(  165) >   dynamic loading 1
(  166) >   support acceleration
(  167) >   transl x function  sin ampl 0.0004 freq 2.610812 phase 0.0
(  168) >   integrate from 0.0 to  20.00 at 0.07660452

(  169) >    end of dynamic loading
(  170) >    dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS   72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                      19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS    16.383
                                              ----------
                                               35.690
                                              ==========



 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                       2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS     1.021
                                              ----------
                                                3.572
                                              ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.46 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.50 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES     2.03 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.45 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.36 SECONDS
 TIME TO PROCESS   78 JOINTS                      3.85 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.18 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.60 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        9.78 SECONDS
 TIME FOR CONDENSATION                          237.48 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.36 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.38 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.75 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.23 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.46 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.11 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        96.25 SECONDS

 *************************
 * EIGEN-SOLUTION CHECKS *
 *************************


 MODE------EIGENVALUE-------FREQUENCY-------FREQUENCY--------PERIOD--------ESTIMATED---/
         ((RAD/SEC)**2)      (RAD/SEC)        (CYC/SEC)        (SEC/CYC)       ACCURACY

    1     6.727454d+01    8.202106d+00    1.305406d+00    7.660454d-01    1.682314d-10
    2     6.954759d+01    8.339520d+00    1.327276d+00    7.534229d-01    1.715818d-10
    3     7.757453d+01    8.807640d+00    1.401780d+00    7.133790d-01    5.332525d-11
    4     8.785211d+01    9.372946d+00    1.491751d+00    6.703533d-01    1.053954d-10
    5     9.546691d+01    9.770717d+00    1.555058d+00    6.430629d-01    9.126849d-11
    6     1.111998d+02    1.054513d+01    1.678310d+00    5.958377d-01    4.898725d-11
    7     1.195056d+02    1.093186d+01    1.739860d+00    5.747590d-01    4.387047d-11
    8     1.396344d+02    1.181670d+01    1.880686d+00    5.317208d-01    4.177525d-11
    9     1.677455d+02    1.295166d+01    2.061321d+00    4.851258d-01    1.219794d-12
   10     2.066677d+02    1.437594d+01    2.288002d+00    4.370625d-01    3.011305d-11
   11     4.878849d+02    2.208812d+01    3.515433d+00    2.844600d-01    2.553983d-11
   12     8.257434d+02    2.873575d+01    4.573437d+00    2.186539d-01    1.439964d-12
   13     1.399263d+03    3.740672d+01    5.953465d+00    1.679694d-01    1.660736d-12
   14     1.500251d+03    3.873308d+01    6.164561d+00    1.622176d-01    7.436474d-12
   15     1.649781d+03    4.061750d+01    6.464476d+00    1.546916d-01    7.459423d-12
   16     1.838761d+03    4.288077d+01    6.824687d+00    1.465269d-01    1.807695d-12
   17     2.046501d+03    4.523827d+01    7.199894d+00    1.388909d-01    4.440182d-13
   18     2.254418d+03    4.748071d+01    7.556789d+00    1.323313d-01    2.205616d-12
   19     2.446104d+03    4.945810d+01    7.871501d+00    1.270406d-01    3.810084d-12
   20     2.586623d+03    5.085885d+01    8.094437d+00    1.235416d-01    2.089889d-12
   21     2.674139d+03    5.171207d+01    8.230232d+00    1.215033d-01    2.045214d-12
   22     3.563408d+03    5.969429d+01    9.500641d+00    1.052561d-01    3.623298d-13
   23     4.780143d+03    6.913858d+01    1.100375d+01    9.087814d-02    1.458916d-12
   24     2.609301d+04    1.615333d+02    2.570882d+01    3.889715d-02    2.697309d-13
```

25	2.806204d+04	1.675173d+02	2.666120d+01	3.750769d-02	2.082313d-13
26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 50.03 SECONDS

TIME TO COMPUTE TIME HISTORY RESPONSE 1039.65 SECONDS
(171) > list dynamic max dis max acc times all joints all
1

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - test1 TITLE - NONE GIVEN

ACTIVE UNITS M N RAD DEGF SEC

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LOADING - 2
==========

MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT			TRANS X-TRANS	TRANS Y-TRANS	TRANS Z-TRANS	ROTATION X-ROTATION	ROTATION Y-ROTATION	ROTATION Z-ROTATIO
1	GLOBAL	MAXIMUM	-0.5831065e-06	-0.1506057e-23	0.1742349e-12	0.6848336e-13	0.	0.2356419e-
		TIME	0.5362316	0.4596272	0.5362316	0.5362316	0.	0.5362316
3	GLOBAL	MAXIMUM	-0.5531440e-05	-0.9620020e-23	0.1744235e-12	0.6855749e-13	0.	0.2001219e-
		TIME	0.4596272	0.4596272	0.5362316	0.5362316	0.	0.4596272
5	GLOBAL	MAXIMUM	0.3181400e-05	-0.8683260e-23	0.1748010e-12	0.6870585e-13	0.	-0.1165627e-
		TIME	1.838509	0.5362316	0.5362316	0.5362316	0.	1.838509
11	GLOBAL	MAXIMUM	0.5837561e-05	0.1373786e-22	0.1770713e-12	0.6959821e-13	0.	-0.2134183e-
		TIME	1.761904	1.761904	0.5362316	0.5362316	0.	1.761904
17	GLOBAL	MAXIMUM	-0.5364676e-05	0.2227234e-20	0.1810681e-12	0.7111333e-13	0.	0.1929251e-
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.	0.5362316
19	GLOBAL	MAXIMUM	-0.4774151e-05	0.3809565e-20	0.1828261e-12	0.7186015e-13	0.	0.1743974e-
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.	0.5362316
44	GLOBAL	MAXIMUM	-0.5843324e-06	0.1504447e-23	-0.3086720e-14	-0.1213241e-14	0.	0.2303275e-
		TIME	0.5362316	0.4596272	1.761904	1.761904	0.	0.5362316
24	GLOBAL	MAXIMUM	0.	0.	0.	0.5871799e-15	0.	0.1910258e-
		TIME	0.	0.	0.	0.5362316	0.	0.5362316
25	GLOBAL	MAXIMUM	-0.4150573e-06	0.	0.	0.5878156e-15	0.	0.1732563e-
		TIME	0.4596272	0.	0.	0.5362316	0.	0.4596272
26	GLOBAL	MAXIMUM	0.2374872e-06	0.	0.	0.5890876e-15	0.	-0.9848722e-
		TIME	1.838509	0.	0.	0.5362316	0.	1.838509
27	GLOBAL	MAXIMUM	-0.6667991e-06	0.	0.	0.5909973e-15	0.	0.2831224e-
		TIME	0.6128362	0.	0.	0.5362316	0.	0.6128362
28	GLOBAL	MAXIMUM	-0.6837768e-06	0.	0.	0.5935467e-15	0.	0.2909409e-
		TIME	0.6128362	0.	0.	0.5362316	0.	0.6128362
29	GLOBAL	MAXIMUM	0.4280617e-06	0.	0.	0.5967388e-15	0.	-0.1816252e-
		TIME	1.761904	0.	0.	0.5362316	0.	1.761904
30	GLOBAL	MAXIMUM	-0.6794173e-06	0.	0.	0.6005768e-15	0.	0.2891272e-
		TIME	0.6128362	0.	0.	0.5362316	0.	0.6128362
31	GLOBAL	MAXIMUM	-0.6828455e-06	0.	0.	0.6050649e-15	0.	0.2904320e-
		TIME	0.6128362	0.	0.	0.5362316	0.	0.6128362
32	GLOBAL	MAXIMUM	-0.4616410e-06	0.	0.	0.7218675e-15	0.	0.1951068e-
		TIME	0.5362316	0.	0.	0.5362316	0.	0.5362316
33	GLOBAL	MAXIMUM	-0.3527405e-06	0.	0.	0.6161327e-15	0.	0.1484825e-
		TIME	0.5362316	0.	0.	0.5362316	0.	0.5362316
34	GLOBAL	MAXIMUM	-0.6569666e-06	0.	0.	0.6227244e-15	0.	0.2776537e-
		TIME	0.5362316	0.	0.	0.5362316	0.	0.5362316

35	GLOBAL	MAXIMUM	0.	0.	0.	0.6299901e-15	0.	0.5205284e-08
		TIME	0.	0.	0.	0.5362316	0.	0.5362316
67	GLOBAL	MAXIMUM	0.	0.	0.	-0.1040239e-16	0.	0.1963664e-08
		TIME	0.	0.	0.	1.761904	0.	0.5362316
68	GLOBAL	MAXIMUM	-0.4103572e-06	0.	0.	-0.1045112e-16	0.	0.1727188e-07
		TIME	0.4596272	0.	0.	1.761904	0.	0.4596272
69	GLOBAL	MAXIMUM	0.2419356e-06	0.	0.	-0.1052156e-16	0.	-0.9911313e-08
		TIME	1.838509	0.	0.	1.761904	0.	1.838509
70	GLOBAL	MAXIMUM	-0.6628825e-06	0.	0.	-0.1061387e-16	0.	0.2826031e-07
		TIME	0.6128362	0.	0.	1.761904	0.	0.6128362
71	GLOBAL	MAXIMUM	-0.6810387e-06	0.	0.	-0.1072823e-16	0.	0.2905636e-07
		TIME	0.6128362	0.	0.	1.761904	0.	0.6128362
72	GLOBAL	MAXIMUM	0.4320756e-06	0.	0.	-0.1086489e-16	0.	-0.1821451e-07
		TIME	1.761904	0.	0.	1.761904	0.	1.761904
73	GLOBAL	MAXIMUM	-0.6769161e-06	0.	0.	-0.1102413e-16	0.	0.2887786e-07
		TIME	0.6128362	0.	0.	1.761904	0.	0.6128362
74	GLOBAL	MAXIMUM	-0.6798093e-06	0.	0.	-0.1120627e-16	0.	0.2900186e-07
		TIME	0.6128362	0.	0.	1.761904	0.	0.6128362
75	GLOBAL	MAXIMUM	-0.3983105e-06	0.	0.	-0.1141170e-16	0.	0.1673934e-07
		TIME	0.5362316	0.	0.	1.761904	0.	0.5362316
76	GLOBAL	MAXIMUM	-0.3559170e-06	0.	0.	-0.1164085e-16	0.	0.1489231e-07
		TIME	0.5362316	0.	0.	1.761904	0.	0.5362316
77	GLOBAL	MAXIMUM	-0.6494526e-06	0.	0.	-0.1189418e-16	0.	0.2766994e-07
		TIME	0.5362316	0.	0.	1.761904	0.	0.5362316
78	GLOBAL	MAXIMUM	0.	0.	0.	-0.1217223e-16	0.	0.5224660e-08
		TIME	0.	0.	0.	1.761904	0.	0.5362316
37	GLOBAL	MAXIMUM	0.	0.	-0.1680028e-12	-0.7341722e-14	0.	0.1490484e-09
		TIME	0.	0.	0.5362316	0.5362316	0.	0.5362316
40	GLOBAL	MAXIMUM	0.	0.	-0.2602124e-30	0.	0.	0.7189556e-08
		TIME	0.	0.	0.5362316	0.	0.	0.5362316
41	GLOBAL	MAXIMUM	0.	0.	-0.1400343e-27	-0.6119498e-29	0.	0.1485435e-09
		TIME	0.	0.	0.5362316	0.5362316	0.	0.5362316
43	GLOBAL	MAXIMUM	0.	0.	0.3340449e-14	0.1459776e-15	0.	0.5233306e-08
		TIME	0.	0.	1.761904	1.761904	0.	0.5362316

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	-0.3381596e-05	-0.3307966e-22	0.1743292e-12	0.2253879e-23	-0.1379700e-05	0.1114846e-05
		TIME	0.4596272	0.4596272	0.5362316	0.4596272	0.4596272	0.4596272
4	GLOBAL	MAXIMUM	-0.4675641e-05	-0.4767871e-22	0.1746123e-12	-0.5473640e-24	0.6726230e-06	0.1571116e-05
		TIME	0.4596272	0.4596272	0.5362316	0.9958588	0.4596272	0.4596272
6	GLOBAL	MAXIMUM	-0.6420391e-05	-0.2961435e-21	0.1750843e-12	0.1296040e-21	-0.1665522e-05	0.2203739e-05
		TIME	0.6128362	0.5362316	0.5362316	0.5362316	0.6128362	0.6128362
7	GLOBAL	MAXIMUM	-0.9048535e-05	-0.4752576e-21	0.1753676e-12	0.6892858e-13	0.	0.3286764e-05
		TIME	0.6128362	0.5362316	0.5362316	0.5362316	0.	0.6128362
8	GLOBAL	MAXIMUM	-0.9617092e-05	-0.3268834e-21	0.1757459e-12	-0.1270474e-21	-0.1661338e-06	0.3334758e-05
		TIME	0.6128362	0.5362316	0.5362316	0.5362316	2.834367	0.6128362
9	GLOBAL	MAXIMUM	-0.9303591e-05	-0.1838721e-22	0.1761242e-12	0.6922592e-13	0.	0.3382751e-05
		TIME	0.6128362	0.6128362	0.5362316	0.5362316	0.	0.6128362
10	GLOBAL	MAXIMUM	-0.7857265e-05	-0.8291171e-22	0.1765977e-12	-0.1319460e-23	0.1023110e-05	0.2719947e-05
		TIME	0.6128362	0.6128362	0.5362316	0.6128362	0.6128362	0.6128362
12	GLOBAL	MAXIMUM	-0.7826435e-05	0.3839617e-21	0.1776408e-12	-0.2574685e-21	-0.1007286e-05	0.2709848e-05
		TIME	0.6128362	0.5362316	0.5362316	0.5362316	0.6128362	0.6128362
13	GLOBAL	MAXIMUM	-0.9246623e-05	0.9132276e-21	0.1782102e-12	0.7004584e-13	0.	0.3362554e-05
		TIME	0.6128362	0.5362316	0.5362316	0.5362316	0.	0.6128362

14	GLOBAL	MAXIMUM	-0.9709256e-05	0.1774379e-20	0.1788761e-12	-0.5230724e-21	-0.1722518e-06	0.3369092e-
		TIME	0.6128362	0.5362316	0.5362316	0.5362316	1.838509	0.6128362
15	GLOBAL	MAXIMUM	-0.9286058e-05	0.2796287e-20	0.1795420e-12	0.7056930e-13	0.	0.3375630e-
		TIME	0.6128362	0.5362316	0.5362316	0.5362316	0.	0.6128362
16	GLOBAL	MAXIMUM	-0.7572618e-05	0.2447442e-20	0.1803050e-12	0.1580704e-21	0.1184384e-05	0.2598363e-
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.6128362	0.5362316
18	GLOBAL	MAXIMUM	-0.5434441e-05	0.2972964e-20	0.1819471e-12	-0.4395370e-21	-0.2279805e-06	0.1836613e-
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	1.838509	0.5362316
20	GLOBAL	MAXIMUM	-0.7213536e-05	0.4732146e-20	0.1838041e-12	-0.5464797e-21	-0.1190186e-05	0.2476164e-
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.6128362	0.5362316
21	GLOBAL	MAXIMUM	-0.8857901e-05	0.5776891e-20	0.1847821e-12	0.7262894e-13	0.	0.3208355e-
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.	0.5362316
22	GLOBAL	MAXIMUM	-0.5592055e-05	0.4793139e-20	0.1858601e-12	0.5203004e-21	0.2024756e-05	0.1917282e-
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.5362316	0.5362316
23	GLOBAL	MAXIMUM	-0.1568779e-05	0.3903810e-20	0.1869381e-12	0.7347635e-13	-0.1541794e-28	0.6262069e-
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.5362316	0.5362316
45	GLOBAL	MAXIMUM	-0.3383116e-05	0.1322316e-21	-0.3093949e-14	-0.2254326e-23	-0.1379800e-05	0.1117729e-
		TIME	0.4596272	0.4596272	1.761904	0.4596272	0.4596272	0.4596272
46	GLOBAL	MAXIMUM	-0.5532957e-05	0.9620020e-23	-0.3101178e-14	-0.1218924e-14	-0.7718981e-29	0.2012450e-
		TIME	0.4596272	0.4596272	1.761904	1.761904	0.5362316	0.4596272
47	GLOBAL	MAXIMUM	-0.4677263e-05	0.1871552e-21	-0.3111630e-14	0.5473548e-24	0.6720519e-06	0.1572262e-
		TIME	0.4596272	0.4596272	1.761904	0.9958588	0.4596272	0.4596272
48	GLOBAL	MAXIMUM	0.3185126e-05	0.8683260e-23	-0.3122081e-14	-0.1227140e-14	-0.7735047e-29	-0.1157694e-
		TIME	1.838509	0.5362316	1.761904	1.761904	0.5362316	1.838509
49	GLOBAL	MAXIMUM	-0.6422072e-05	0.2586709e-21	-0.3135777e-14	0.1251581e-23	-0.1664021e-05	0.2202669e-
		TIME	0.6128362	0.6128362	1.761904	0.2298136	0.6128362	0.6128362
50	GLOBAL	MAXIMUM	-0.9046644e-05	0.9721924e-23	-0.3149472e-14	-0.1237906e-14	-0.7759346e-29	0.3294472e-
		TIME	0.6128362	0.6128362	1.761904	1.761904	0.5362316	0.6128362
51	GLOBAL	MAXIMUM	-0.9619084e-05	0.3926994e-21	-0.3166440e-14	0.2639877e-23	-0.1661101e-06	0.3341138e-
		TIME	0.6128362	0.6128362	1.761904	1.838509	2.834367	0.6128362
52	GLOBAL	MAXIMUM	-0.9301631e-05	0.1838721e-22	-0.3183408e-14	-0.1251244e-14	-0.7791904e-29	0.3387804e-
		TIME	0.6128362	0.6128362	1.761904	1.761904	0.5362316	0.6128362
53	GLOBAL	MAXIMUM	-0.7859057e-05	0.3239758e-21	-0.3203683e-14	0.1319460e-23	0.1022215e-05	0.2717368e-
		TIME	0.6128362	0.6128362	1.761904	0.6128362	0.6128362	0.6128362
54	GLOBAL	MAXIMUM	0.5838944e-05	-0.1373786e-22	-0.3223959e-14	-0.1267183e-14	-0.7832755e-29	-0.2125990e-
		TIME	1.761904	1.761904	1.761904	1.761904	0.5362316	1.761904
55	GLOBAL	MAXIMUM	-0.7828215e-05	0.3307444e-21	-0.3247584e-14	-0.5898007e-23	-0.1006391e-05	0.2707006e-
		TIME	0.6128362	0.6128362	1.761904	0.5362316	0.6128362	0.6128362
56	GLOBAL	MAXIMUM	-0.9244663e-05	0.3489101e-22	-0.3271209e-14	-0.1285755e-14	-0.7881941e-29	0.3367081e-
		TIME	0.6128362	0.5362316	1.761904	1.761904	0.5362316	0.6128362
57	GLOBAL	MAXIMUM	-0.9711256e-05	0.4329218e-21	-0.3298233e-14	-0.9693580e-23	-0.1722333e-06	0.3374215e-
		TIME	0.6128362	0.6128362	1.761904	0.5362316	1.838509	0.6128362
58	GLOBAL	MAXIMUM	-0.9284105e-05	0.6978787e-22	-0.3325257e-14	-0.1306998e-14	-0.7939513e-29	0.3381349e-
		TIME	0.6128362	0.5362316	1.761904	1.761904	0.5362316	0.6128362
59	GLOBAL	MAXIMUM	-0.7574419e-05	0.3546161e-21	-0.3355735e-14	-0.6267276e-23	0.1183391e-05	0.2612710e-
		TIME	0.5362316	0.5362316	1.761904	1.761904	0.6128362	0.5362316
60	GLOBAL	MAXIMUM	-0.5366444e-05	0.4727905e-22	-0.3386214e-14	-0.1330958e-14	-0.8005531e-29	0.1953146e-
		TIME	0.5362316	0.5362316	1.761904	1.761904	0.5362316	0.5362316
61	GLOBAL	MAXIMUM	-0.5436106e-05	0.2743922e-21	-0.3420212e-14	-0.9975036e-23	-0.2278511e-06	0.1845658e-
		TIME	0.5362316	0.5362316	1.761904	0.5362316	1.838509	0.5362316
62	GLOBAL	MAXIMUM	-0.4776542e-05	0.8318915e-22	-0.3454209e-14	-0.1357683e-14	-0.8081680e-29	0.1738170e-
		TIME	0.5362316	0.5362316	1.761904	1.761904	0.5362316	0.5362316
63	GLOBAL	MAXIMUM	-0.7215341e-05	0.3857300e-21	-0.3491795e-14	-0.1186558e-22	-0.1189101e-05	0.2481146e-
		TIME	0.5362316	0.5362316	1.761904	0.5362316	0.6128362	0.5362316
64	GLOBAL	MAXIMUM	-0.8856139e-05	0.1259052e-21	-0.3529381e-14	-0.1387230e-14	-0.8166423e-29	0.3224122e-
		TIME	0.5362316	0.5362316	1.761904	1.761904	0.5362316	0.5362316
65	GLOBAL	MAXIMUM	-0.5593732e-05	0.3192404e-21	-0.3570634e-14	0.1333285e-22	0.2028709e-05	0.1917713e-
		TIME	0.5362316	0.5362316	1.761904	0.5362316	0.5362316	0.5362316
66	GLOBAL	MAXIMUM	-0.1552785e-05	0.7790619e-22	-0.3611888e-14	-0.1419659e-14	0.	0.6113009e-

		TIME	0.5362316	0.5362316	1.761904	1.761904	0.	0.5362316
36	GLOBAL	MAXIMUM	-0.1563570e-05	0.3016719e-26	-0.1536132e-09	-0.6056682e-10	0.9085697e-25	0.6171241e-0
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.5362316	0.5362316
38	GLOBAL	MAXIMUM	-0.5830017e-06	0.8491165e-27	-0.1182310e-29	0.	-0.1979365e-29	0.2265375e-0
		TIME	0.5362316	0.5362316	0.5362316	0.	0.5362316	0.5362316
39	GLOBAL	MAXIMUM	-0.1558273e-05	0.7211999e-24	-0.1280402e-24	-0.5048386e-25	-0.9074124e-25	0.6150336e-0
		TIME	0.5362316	0.5362316	0.5362316	0.5362316	0.5362316	0.5362316
42	GLOBAL	MAXIMUM	-0.1552888e-05	0.1604541e-24	0.4665664e-13	0.1702551e-13	0.3041571e-29	0.6103654e-0
		TIME	0.5362316	0.5362316	1.761904	1.761904	1.761904	0.5362316

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
1	GLOBAL	MAXIMUM	0.2446117e-04	0.4089596e-22	0.4674740e-11	0.1837415e-11	0.	-0.9725572e-05
		TIME	0.3830226	0.4596272	0.7660452e-01	0.7660452e-01	0.	0.3830226
3	GLOBAL	MAXIMUM	0.1575153e-03	0.2586109e-21	0.4679801e-11	0.1839404e-11	-0.2240022e-29	-0.5705741e-04
		TIME	0.4596272	0.4596272	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.4596272
5	GLOBAL	MAXIMUM	-0.6542480e-04	-0.1625105e-21	0.4689928e-11	0.1843385e-11	-0.2244964e-29	0.2346222e-04
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.1532090
11	GLOBAL	MAXIMUM	-0.1086581e-03	-0.2535585e-21	0.4750842e-11	0.1867327e-11	-0.2274531e-29	0.3941606e-04
		TIME	1.761904	1.761904	0.7660452e-01	0.7660452e-01	0.7660452e-01	1.761904
17	GLOBAL	MAXIMUM	0.1143120e-03	0.5992248e-19	0.4858076e-11	0.1907978e-11	-0.1877193e-29	-0.4101533e-04
		TIME	0.4596272	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.4596272
19	GLOBAL	MAXIMUM	0.1028729e-03	0.1023713e-18	0.4905244e-11	0.1928015e-11	-0.2349288e-29	-0.3764753e-04
		TIME	0.4596272	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.4596272
44	GLOBAL	MAXIMUM	0.2452697e-04	-0.4089090e-22	0.2137579e-12	0.8401795e-13	0.9221907e-29	-0.9651635e-05
		TIME	0.3830226	0.4596272	0.3830226	0.3830226	0.3830226	0.3830226
24	GLOBAL	MAXIMUM	0.	0.	0.	0.1575410e-13	0.	-0.8149114e-07
		TIME	0.	0.	0.	0.7660452e-01	0.	0.3830226
25	GLOBAL	MAXIMUM	0.1142883e-04	0.	0.	0.1577115e-13	0.	-0.4953973e-06
		TIME	0.4596272	0.	0.	0.7660452e-01	0.	0.4596272
26	GLOBAL	MAXIMUM	-0.6106577e-05	0.	0.	0.1580528e-13	0.	-0.1998270e-06
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.3830226
27	GLOBAL	MAXIMUM	0.1420159e-04	0.	0.	0.1585652e-13	0.	-0.5968644e-06
		TIME	0.5362316	0.	0.	0.7660452e-01	0.	0.5362316
28	GLOBAL	MAXIMUM	0.1512827e-04	0.	0.	0.1592492e-13	0.	-0.6182877e-06
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
29	GLOBAL	MAXIMUM	-0.8747797e-05	0.	0.	0.1601056e-13	0.	0.3354604e-04
		TIME	1.761904	0.	0.	0.7660452e-01	0.	1.761904
30	GLOBAL	MAXIMUM	0.1459872e-04	0.	0.	0.1611354e-13	0.	-0.5959134e-06
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
31	GLOBAL	MAXIMUM	0.1508052e-04	0.	0.	0.1623395e-13	0.	-0.6156638e-06
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
32	GLOBAL	MAXIMUM	0.9857602e-05	0.	0.	0.1936778e-13	0.	-0.4165152e-06
		TIME	0.4596272	0.	0.	0.7660452e-01	0.	0.4596272
33	GLOBAL	MAXIMUM	-0.7724163e-05	0.	0.	0.1653090e-13	0.	-0.3215949e-0
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.4596272
34	GLOBAL	MAXIMUM	0.1462295e-04	0.	0.	0.1670776e-13	0.	-0.6126799e-0
		TIME	0.5362316	0.	0.	0.7660452e-01	0.	0.5362316
35	GLOBAL	MAXIMUM	0.	0.	0.	0.1690270e-13	0.	-0.1376702e-0
		TIME	0.	0.	0.	0.7660452e-01	0.	0.5362316
67	GLOBAL	MAXIMUM	0.	0.	0.	0.7203743e-15	0.	-0.8256126e-0
		TIME	0.	0.	0.	0.3830226	0.	0.3830226
68	GLOBAL	MAXIMUM	0.1124209e-04	0.	0.	0.7237487e-15	0.	-0.4934289e-0
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
69	GLOBAL	MAXIMUM	-0.6183834e-05	0.	0.	0.7286270e-15	0.	-0.2002024e-0

		TIME	0.1532090	0.	0.	0.3830226	0.	0.3830226
70	GLOBAL	MAXIMUM	0.1408065e-04	0.	0.	0.7350195e-15	0.	-0.5953162e-0
		TIME	0.5362316	0.	0.	0.3830226	0.	0.5362316
71	GLOBAL	MAXIMUM	0.1502882e-04	0.	0.	0.7429393e-15	0.	-0.6169920e-0
		TIME	0.6128362	0.	0.	0.3830226	0.	0.6128362
72	GLOBAL	MAXIMUM	-0.8821341e-05	0.	0.	0.7524030e-15	0.	0.3364102e-0
		TIME	1.761904	0.	0.	0.3830226	0.	1.761904
73	GLOBAL	MAXIMUM	0.1451779e-04	0.	0.	0.7634302e-15	0.	-0.5948423e-0
		TIME	0.6128362	0.	0.	0.3830226	0.	0.6128362
74	GLOBAL	MAXIMUM	0.1496791e-04	0.	0.	0.7760438e-15	0.	-0.6143815e-0
		TIME	0.6128362	0.	0.	0.3830226	0.	0.6128362
75	GLOBAL	MAXIMUM	-0.8495502e-05	0.	0.	0.7902700e-15	0.	-0.3580580e-0
		TIME	0.1532090	0.	0.	0.3830226	0.	0.4596272
76	GLOBAL	MAXIMUM	-0.7767505e-05	0.	0.	0.8061384e-15	0.	-0.3222360e-0
		TIME	0.1532090	0.	0.	0.3830226	0.	0.4596272
77	GLOBAL	MAXIMUM	0.1443148e-04	0.	0.	0.8236820e-15	0.	-0.6105439e-0
		TIME	0.5362316	0.	0.	0.3830226	0.	0.5362316
78	GLOBAL	MAXIMUM	0.	0.	0.	0.8429373e-15	0.	-0.1378016e-0
		TIME	0.	0.	0.	0.3830226	0.	0.5362316
37	GLOBAL	MAXIMUM	0.	0.	-0.4507532e-11	-0.1969791e-12	0.	-0.3929801e-0
		TIME	0.	0.	0.7660452e-01	0.7660452e-01	0.	0.5362316
40	GLOBAL	MAXIMUM	0.	0.	-0.6796689e-29	0.	0.	-0.3018133e-0
		TIME	0.	0.	0.7660452e-01	0.	0.	0.3830226
41	GLOBAL	MAXIMUM	0.	0.	-0.3755130e-26	-0.1640992e-27	0.	-0.3916617e-0
		TIME	0.	0.	0.7660452e-01	0.7660452e-01	0.	0.5362316
43	GLOBAL	MAXIMUM	0.	0.	-0.2313289e-12	-0.1010907e-13	0.	-0.1379873e-0
		TIME	0.	0.	0.3830226	0.3830226	0.	0.5362316

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	0.8346530e-04	0.8449908e-21	0.4677271e-11	-0.6047638e-22	0.4446292e-04	-0.2813481e-0
		TIME	0.4596272	0.4596272	0.7660452e-01	0.4596272	0.4596272	0.4596272
4	GLOBAL	MAXIMUM	0.1125591e-03	0.1123057e-20	0.4684864e-11	0.4940102e-22	-0.3205220e-04	-0.3725093e-0
		TIME	0.4596272	0.4596272	0.7660452e-01	0.9958588	0.9958588	0.4596272
6	GLOBAL	MAXIMUM	0.1115667e-03	0.7126702e-20	0.4697530e-11	0.3417836e-20	0.4738741e-04	-0.3858959e-0
		TIME	0.5362316	0.5362316	0.7660452e-01	0.7660452e-01	0.6128362	0.5362316
7	GLOBAL	MAXIMUM	0.1907034e-03	-0.1243748e-19	0.4705132e-11	0.1849361e-11	-0.2252357e-29	-0.6913384e-0
		TIME	0.5362316	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.5362316
8	GLOBAL	MAXIMUM	0.2015001e-03	0.7961413e-20	0.4715280e-11	-0.3413936e-20	0.1408160e-04	-0.6902250e-0
		TIME	0.6128362	0.5362316	0.7660452e-01	0.7660452e-01	2.834367	0.6128362
9	GLOBAL	MAXIMUM	0.1980987e-03	0.3739177e-21	0.4725429e-11	0.1857339e-11	-0.2262209e-29	-0.7172057e-0
		TIME	0.6128362	0.6128362	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.6128362
10	GLOBAL	MAXIMUM	0.1464900e-03	0.1540430e-20	0.4738135e-11	0.4718928e-22	-0.3660732e-04	-0.5042948e-0
		TIME	0.5362316	0.5362316	0.7660452e-01	0.6128362	0.6128362	0.5362316
12	GLOBAL	MAXIMUM	-0.1462442e-03	0.1172542e-19	0.4766120e-11	-0.6937751e-20	0.3464246e-04	0.5017428e-0
		TIME	1.761904	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.6128362	1.761904
13	GLOBAL	MAXIMUM	0.1910252e-03	0.2483347e-19	0.4781397e-11	0.1879337e-11	-0.2289336e-29	-0.6918617e-0
		TIME	0.6128362	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.6128362
14	GLOBAL	MAXIMUM	0.2047202e-03	0.4945754e-19	0.4799263e-11	-0.1403375e-19	-0.1635049e-04	-0.7029676e-0
		TIME	0.6128362	0.7660452e-01	0.7660452e-01	0.7660452e-01	2.144927	0.6128362
15	GLOBAL	MAXIMUM	0.1972632e-03	0.7535493e-19	0.4817129e-11	0.1893382e-11	-0.2306642e-29	-0.7140735e-0
		TIME	0.6128362	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.6128362
16	GLOBAL	MAXIMUM	0.1502020e-03	0.6701918e-19	0.4837603e-11	0.4286792e-20	0.4504218e-04	-0.5143055e-0
		TIME	0.5362316	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9958588	0.5362316
18	GLOBAL	MAXIMUM	0.1167092e-03	0.8055197e-19	0.4881660e-11	-0.1179134e-19	0.9835431e-05	-0.3933143e-0

		TIME	0.4596272	0.7660452e-01	0.7660452e-01	0.7660452e-01	1.838509	0.4596272
20	GLOBAL	MAXIMUM	0.1496682e-03	0.1281885e-18	0.4931483e-11	-0.1469321e-19	-0.4382387e-04	-0.5138028e-04
		TIME	0.5362316	0.7660452e-01	0.7660452e-01	0.7660452e-01	1.608695	0.5362316
21	GLOBAL	MAXIMUM	0.1955519e-03	0.1552668e-18	0.4957722e-11	0.1948642e-11	-0.2374676e-29	-0.7076854e-04
		TIME	0.5362316	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.5362316
22	GLOBAL	MAXIMUM	0.1284028e-03	0.1295163e-18	0.4986645e-11	0.1402295e-19	-0.4992540e-04	-0.4361356e-04
		TIME	0.5362316	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.6128362	0.5362316
23	GLOBAL	MAXIMUM	0.4136022e-04	0.1047842e-18	0.5015567e-11	0.1971378e-11	-0.4136649e-27	-0.1645853e-04
		TIME	0.5362316	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.5362316
45	GLOBAL	MAXIMUM	0.8349261e-04	-0.3350189e-20	0.2142586e-12	0.6047779e-22	0.4448571e-04	-0.2824099e-04
		TIME	0.4596272	0.4596272	0.3830226	0.4596272	0.4596272	0.4596272
46	GLOBAL	MAXIMUM	0.1575650e-03	-0.2586109e-21	0.2147592e-12	0.8441151e-13	-0.2128021e-27	-0.5747560e-04
		TIME	0.4596272	0.4596272	0.3830226	0.3830226	0.7660452e-01	0.4596272
47	GLOBAL	MAXIMUM	0.1126065e-03	-0.4434103e-20	0.2154830e-12	-0.4940081e-22	-0.3206446e-04	-0.3732456e-04
		TIME	0.4596272	0.4596272	0.3830226	0.9958588	0.9958588	0.4596272
48	GLOBAL	MAXIMUM	-0.6549724e-04	0.1625105e-21	0.2162068e-12	0.8498047e-13	-0.2132716e-27	-0.2335391e-04
		TIME	0.1532090	0.1532090	0.3830226	0.3830226	0.7660452e-01	0.3830226
49	GLOBAL	MAXIMUM	0.1115916e-03	-0.4468255e-20	0.2171552e-12	-0.1497262e-21	0.4737357e-04	-0.3852146e-04
		TIME	0.5362316	0.5362316	0.3830226	0.1532090	0.6128362	0.5362316
50	GLOBAL	MAXIMUM	0.1906681e-03	0.7015248e-21	0.2181036e-12	0.8572603e-13	-0.2139739e-27	-0.6938356e-04
		TIME	0.5362316	0.1532090	0.3830226	0.3830226	0.7660452e-01	0.5362316
51	GLOBAL	MAXIMUM	0.2015490e-03	-0.8197286e-20	0.2192786e-12	-0.1633864e-21	0.1408043e-04	-0.6923026e-04
		TIME	0.6128362	0.6128362	0.3830226	0.3830226	2.834367	0.6128362
52	GLOBAL	MAXIMUM	0.1980596e-03	-0.3739177e-21	0.2204537e-12	0.8664972e-13	-0.2149098e-27	-0.7192065e-04
		TIME	0.6128362	0.6128362	0.3830226	0.3830226	0.7660452e-01	0.6128362
53	GLOBAL	MAXIMUM	0.1465265e-03	-0.6007809e-20	0.2218578e-12	-0.4718928e-22	-0.3659471e-04	-0.5035780e-04
		TIME	0.5362316	0.5362316	0.3830226	0.6128362	0.6128362	0.5362316
54	GLOBAL	MAXIMUM	-0.1086825e-03	0.2535585e-21	0.2232618e-12	0.8775348e-13	-0.2160804e-27	0.3926548e-04
		TIME	1.761904	1.761904	0.3830226	0.3830226	0.7660452e-01	1.761904
55	GLOBAL	MAXIMUM	-0.1462789e-03	-0.6241310e-20	0.2248979e-12	-0.3435143e-21	0.3462976e-04	0.5015799e-04
		TIME	1.761904	0.5362316	0.3830226	0.3830226	0.6128362	1.761904
56	GLOBAL	MAXIMUM	0.1909857e-03	0.1126147e-20	0.2265340e-12	0.8903959e-13	-0.2174869e-27	-0.6934492e-04
		TIME	0.6128362	0.3830226	0.3830226	0.3830226	0.7660452e-01	0.6128362
57	GLOBAL	MAXIMUM	0.2047681e-03	-0.8871528e-20	0.2284054e-12	-0.6734666e-21	-0.1634928e-04	-0.7048015e-04
		TIME	0.6128362	0.5362316	0.3830226	0.3830226	2.144927	0.6128362
58	GLOBAL	MAXIMUM	0.1972231e-03	0.3550625e-20	0.2302768e-12	0.9051073e-13	-0.2191310e-27	-0.7161539e-04
		TIME	0.6128362	0.3830226	0.3830226	0.3830226	0.7660452e-01	0.6128362
59	GLOBAL	MAXIMUM	0.1502397e-03	-0.7518718e-20	0.2323875e-12	0.3457536e-21	0.4504251e-04	-0.5160399e-04
		TIME	0.5362316	0.5362316	0.3830226	0.3830226	0.9958588	0.5362316
60	GLOBAL	MAXIMUM	0.1143536e-03	0.2305919e-20	0.2344982e-12	0.9216995e-13	-0.2210143e-27	-0.4175750e-04
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	0.7660452e-01	0.4596272
61	GLOBAL	MAXIMUM	0.1167463e-03	-0.5822865e-20	0.2368525e-12	-0.7071757e-21	0.9837957e-05	-0.3967751e-04
		TIME	0.4596272	0.5362316	0.3830226	0.3830226	1.838509	0.4596272
62	GLOBAL	MAXIMUM	0.1029272e-03	0.4851750e-20	0.2392069e-12	0.9402070e-13	-0.2231824e-27	-0.3759752e-04
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	0.7660452e-01	0.4596272
63	GLOBAL	MAXIMUM	0.1497048e-03	-0.8989520e-20	0.2418097e-12	-0.7501335e-21	-0.4381417e-04	-0.5148653e-04
		TIME	0.5362316	0.5362316	0.3830226	0.3830226	1.608695	0.5362316
64	GLOBAL	MAXIMUM	0.1955103e-03	0.7552229e-20	0.2444126e-12	0.9606682e-13	-0.2255942e-27	-0.7113814e-04
		TIME	0.5362316	0.3830226	0.3830226	0.3830226	0.7660452e-01	0.5362316
65	GLOBAL	MAXIMUM	0.1284469e-03	-0.8072857e-20	0.2472694e-12	0.6493659e-21	-0.4994914e-04	-0.4362553e-04
		TIME	0.5362316	0.5362316	0.3830226	0.3830226	0.6128362	0.5362316
66	GLOBAL	MAXIMUM	0.4094195e-04	0.5214514e-20	0.2501263e-12	0.9831258e-13	-0.3646345e-29	-0.1611287e-04
		TIME	0.5362316	0.3830226	0.3830226	0.3830226	0.3830226	0.5362316
36	GLOBAL	MAXIMUM	0.4122500e-04	-0.7877361e-25	-0.4121458e-08	-0.1625014e-08	0.2437702e-23	-0.1627106e-04
		TIME	0.5362316	0.5362316	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.5362316
38	GLOBAL	MAXIMUM	0.2447407e-04	-0.3175250e-25	-0.3088168e-28	-0.9358727e-29	-0.5310655e-28	-0.9509910e-04
		TIME	0.3830226	0.3830226	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.3830226
39	GLOBAL	MAXIMUM	0.4108669e-04	-0.1901568e-22	-0.3433500e-23	-0.1353765e-23	-0.2434597e-23	-0.1621647e-04
		TIME	0.5362316	0.5362316	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.5362316

```
 42        GLOBAL    MAXIMUM    0.4094521e-04  -0.4229497e-23  -0.3231011e-11  -0.1179031e-11  -0.2106313e-27  -0.1609359e-(
                      TIME       0.5362316       0.5362316       0.3830226       0.3830226       0.3830226       0.5362316
 (  172) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  172) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  172) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  172) >  $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  172) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:27:26.9          Elapsed time: 0:59:49.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  10 pools of 524288 bytes total 5242880 bytes (3943%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 2, R_Get 70, R_Put 1, R_Del 1
 B_Read 4, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 1 TRAFFIC INDUCED VIBRATIONS
AMPLITUDE 0.00054 FREQUENCY 5.2216

**** ACTIVE UNITS - LENGTH WEIGHT ANGLE TEMPERATURE TIME
**** ASSUMED TO BE INCH POUND RADIAN FAHRENHEIT SECOND

(2) > units m n
(3) > type space frame
(4) > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

(5) > repeat 1 id 43 x 14.4

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

(6) > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

```
{    7} > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
{    8} > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
{    9} > joints coordinates
{   10} > 36 3.6 3.8 39.6 F
{   11} > 37 3.6 0.0 39.6 S
{   12} > 38 7.2 3.8 0.0 F
{   13} > 39 7.2 3.8 39.6 F
{   14} > 40 7.2 0.0 0.0 S
{   15} > 41 7.2 0.0 39.6 S
{   16} > 42 10.8 3.8 39.6 F
{   17} > 43 10.8 0.0 39.6 S
{   18} > member incidences
{   19} > 'b1' 1 2
{   20} > 'b2' 2 3
{   21} > 'b3' 3 4
{   22} > 'b4' 4 5
{   23} > 'b5' 5 6
{   24} > 'b6' 6 7
{   25} > 'b7' 7 8
{   26} > 'b8' 8 9
{   27} > 'b9' 9 10
{   28} > 'b10' 10 11
{   29} > 'b11' 11 12
{   30} > 'b12' 12 13
{   31} > 'b13' 13 14
{   32} > 'b14' 14 15
{   33} > 'b15' 15 16
{   34} > 'b16' 16 17
{   35} > 'b17' 17 18
{   36} > 'b18' 18 19
{   37} > 'b19' 19 20
{   38} > member incidences
{   39} > 'b20' 20 21
{   40} > 'b21' 21 22
{   41} > 'b22' 22 23
{   42} > 'ba23'  1 38
{   43} > 'ba24' 38 44
{   44} > 'bb25'  2 45
{   45} > 'bb26'  3 46
{   46} > 'bb27'  4 47
{   47} > 'bb28'  5 48
{   48} > 'bb29'  6 49
{   49} > 'bb30'  7 50
{   50} > 'bb31'  8 51
{   51} > 'bb32'  9 52
{   52} > 'bb33' 10 53
{   53} > 'bb34' 11 54
{   54} > 'bb35' 12 55
{   55} > 'bb36' 13 56
{   56} > 'bb37' 14 57
{   57} > 'bb38' 15 58
{   58} > 'bb39' 16 59
{   59} > 'bb40' 17 60
{   60} > 'bb41' 18 61
{   61} > member incidences
{   62} > 'bb42' 19 62
{   63} > 'bb43' 20 63
{   64} > 'bb44' 21 64
{   65} > 'bb45' 22 65
{   66} > 'bc46' 23 36
{   67} > 'bc47' 36 39
{   68} > 'bc48' 39 42
{   69} > 'bc49' 42 66
{   70} > 'bd50' 44 45
{   71} > 'bd51' 45 46
{   72} > 'bd52' 46 47
{   73} > 'bd53' 47 48
{   74} > 'bd54' 48 49
{   75} > 'bd55' 49 50
{   76} > 'bd56' 50 51
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(   77) > 'bd57' 51 52
(   78) > 'bd58' 52 53
(   79) > 'bd59' 53 54
(   80) > 'bd60' 54 55
(   81) > 'bd61' 55 56
(   82) > 'bd62' 56 57
(   83) > 'bd63' 57 58
(   84) > 'bd64' 58 59
(   85) > 'bd65' 59 60
(   86) > 'bd66' 60 61
(   87) > 'bd67' 61 62
(   88) > 'bd68' 62 63
(   89) > 'bd69' 63 64
(   90) > 'bd70' 64 65
(   91) > member incidences
(   92) > 'bd71' 65 66
(   93) > 's72'  24  1
(   94) > 's73'  25  3
(   95) > 's74'  26  5
(   96) > 's75'  27  7
(   97) > 's76'  28  9
(   98) > 's77'  29 11
(   99) > 's78'  30 13
(  100) > 's79'  31 15
(  101) > 's80'  32 17
(  102) > 's81'  33 19
(  103) > 's82'  34 21
(  104) > 's83'  35 23
(  105) > 's84'  37 36
(  106) > 's85'  40 38
(  107) > 's86'  41 39
(  108) > 's87'  43 42
(  109) > 's88'  67 44
(  110) > 's89'  68 46
(  111) > 's90'  69 48
(  112) > 's91'  70 50
(  113) > 's92'  71 52
(  114) > 's93'  72 54
(  115) > 's94'  73 56
(  116) > 's95'  74 58
(  117) > 's96'  75 60
(  118) > 's97'  76 62
(  119) > 's98'  77 64
(  120) > 's99'  78 66
(  121) >
(  121) > joint releases
(  122) > 25 to 34 kfx 1.15E7
(  123) > 68 to 77 kfx 1.15E7
(  124) > 40 37 41 43 kfz 1.15E7
(  125) > 1 for y for z mom x mom y mom z kfx  3.2574E6
(  126) > 3 for y for z mom x mom y mom z kfx 7.0822E5
(  127) > 5 for y for z mom x mom y mom z kfx 2.1247E6
(  128) > 11 for y for z mom x mom y mom z kfx 7.0822E5
(  129) > 17 for y for z mom x mom y mom z kfx 7.0822E5
(  130) > 19 for y for z mom x mom y mom z kfx 1.11225E6
(  131) > 44 for x for y mom x mom y mom z kfz 1.11225E6
(  132) > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
(  133) > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
(  134) >
(  134) > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
(  135) >
(  135) > member releases
(  136) > 'bb25' to 'bb45' start          moment x y z end moment y z
(  137) > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
(  138) > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
(  139) > 'ba23' 'ba24' start mom x y z end mom z y
(  140) > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
(  141) > member eccentricities
(  142) > 'bb25' to 'bb45' start x 0.15
(  143) > member properties prismatic
(  144) > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
(  145) > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
(  146) > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
(  147) > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
(  148) > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
(  149) > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  150) > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  151) > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
(  152) > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
(  153) > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
(  154) > material constants
(  155) > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
(  156) > material concrete 's85' 's80' 'bb25' to 'bb45'
(  157) > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
(  158) > material steel 'bd50' to 'bd71'
(  159) > constants beta 0.0 all
(  160) > dead load 'dl' direction -y all members
(  161) > damping percents 2.5 50
```

```
(  162) > inertia of joints lumped
(  163) > dynamic degrees of freedom with static condensation
(  164) > generate  70 from joints translations x
(  165) >
(  165) >   dynamic loading 1
(  166) >   support acceleration
(  167) >   transl x function  sin ampl 0.00054 freq 32.8084312 phase 0.0
(  168) >   integrate from 0.0 to  20.00 at 0.07660452

(  169) >    end of dynamic loading
(  170) >    dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS   72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                      19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS    16.383
                                              ----------
                                               35.690
                                              ==========



 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                       2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS     1.021
                                              ----------
                                                3.572
                                              ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.44 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.39 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES    1.86 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.40 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.10 SECONDS
 TIME TO PROCESS   78 JOINTS                      3.88 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.23 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.60 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        9.78 SECONDS
 TIME FOR CONDENSATION                          231.66 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.33 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.15 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.61 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.13 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.21 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.10 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        93.88 SECONDS

 *************************
 * EIGEN-SOLUTION CHECKS *
 *************************


 MODE------EIGENVALUE-------FREQUENCY-------FREQUENCY--------PERIOD--------ESTIMATED---/
         ((RAD/SEC)**2)      (RAD/SEC)        (CYC/SEC)        (SEC/CYC)       ACCURACY

    1     6.727454d+01    8.202106d+00    1.305406d+00    7.660454d-01    1.682314d-10
    2     6.954759d+01    8.339520d+00    1.327276d+00    7.534229d-01    1.715818d-10
    3     7.757453d+01    8.807640d+00    1.401780d+00    7.133790d-01    5.332525d-11
    4     8.785211d+01    9.372946d+00    1.491751d+00    6.703533d-01    1.053954d-10
    5     9.546691d+01    9.770717d+00    1.555058d+00    6.430629d-01    9.126849d-11
    6     1.111998d+02    1.054513d+01    1.678310d+00    5.958377d-01    4.898725d-11
    7     1.195056d+02    1.093186d+01    1.739860d+00    5.747590d-01    4.387047d-11
    8     1.396344d+02    1.181670d+01    1.880686d+00    5.317208d-01    4.177525d-11
    9     1.677455d+02    1.295166d+01    2.061321d+00    4.851258d-01    1.219794d-12
   10     2.066677d+02    1.437594d+01    2.288002d+00    4.370625d-01    3.011305d-11
   11     4.878849d+02    2.208812d+01    3.515433d+00    2.844600d-01    2.553983d-11
   12     8.257434d+02    2.873575d+01    4.573437d+00    2.186539d-01    1.439964d-12
   13     1.399263d+03    3.740672d+01    5.953465d+00    1.679694d-01    1.660736d-12
   14     1.500251d+03    3.873308d+01    6.164561d+00    1.622176d-01    7.436474d-12
   15     1.649781d+03    4.061750d+01    6.464476d+00    1.546916d-01    7.459423d-12
   16     1.838761d+03    4.288077d+01    6.824687d+00    1.465269d-01    1.807695d-12
   17     2.046501d+03    4.523827d+01    7.199894d+00    1.388909d-01    4.440182d-13
   18     2.254418d+03    4.748071d+01    7.556789d+00    1.323313d-01    2.205616d-12
   19     2.446104d+03    4.945810d+01    7.871501d+00    1.270406d-01    3.810084d-12
   20     2.586623d+03    5.085885d+01    8.094437d+00    1.235416d-01    2.089889d-12
   21     2.674139d+03    5.171207d+01    8.230232d+00    1.215033d-01    2.045214d-12
   22     3.563408d+03    5.969429d+01    9.500641d+00    1.052561d-01    3.623298d-13
   23     4.780143d+03    6.913858d+01    1.100375d+01    9.087814d-02    1.458916d-12
   24     2.609301d+04    1.615333d+02    2.570882d+01    3.889715d-02    2.697309d-13
```

25	2.806204d+04	1.675173d+02	2.666120d+01	3.750769d-02	2.082313d-13
26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 48.58 SECONDS

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 TIME TO COMPUTE TIME HISTORY RESPONSE        1016.00 SECONDS
 ( 171) >  list dynamic max dis max acc times all joints all
1


    ****************************
    *RESULTS OF LATEST ANALYSES*
    ****************************


     PROBLEM - test1      TITLE - NONE GIVEN

     ACTIVE UNITS  M    N    RAD  DEGF SEC


================================================================================================================================
 LOADING -  2
================================================================================================================================


     MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT                          /--------------------TRANS--------------------//--------------------ROTATION----------------
                                   X-TRANS         Y-TRANS         Z-TRANS        X-ROTATION      Y-ROTATION      Z-ROTATION

1         GLOBAL    MAXIMUM   0.1077132e-05  -0.3307294e-24  0.8723741e-13  0.3428883e-13         0.       -0.4217858e-0
                    TIME      0.6128362       0.1532090       0.9192543      0.9192543             0.        0.6128362

3         GLOBAL    MAXIMUM  -0.1246145e-05  -0.2216321e-23  0.8733185e-13  0.3432594e-13         0.        0.4585420e-0
                    TIME      0.1532090       0.1532090       0.9192543      0.9192543             0.        0.1532090

5         GLOBAL    MAXIMUM  -0.8763488e-06  -0.2047505e-23  0.8752083e-13  0.3440022e-13         0.        0.3272900e-0
                    TIME      0.1532090       0.1532090       0.9192543      0.9192543             0.        0.1532090

11        GLOBAL    MAXIMUM  -0.1054994e-05  -0.2298117e-23  0.8865757e-13  0.3484702e-13         0.        0.3917720e-0
                    TIME      0.1532090       0.1532090       0.9192543      0.9192543             0.        0.1532090

17        GLOBAL    MAXIMUM  -0.1055071e-05   0.1119617e-20  0.9065871e-13  0.3560562e-13         0.        0.3869519e-0
                    TIME      0.1532090       0.9192543       0.9192543      0.9192543             0.        0.1532090

19        GLOBAL    MAXIMUM  -0.1003667e-05   0.1911792e-20  0.9153894e-13  0.3597955e-13         0.        0.3731869e-0
                    TIME      0.1532090       0.9192543       0.9192543      0.9192543             0.        0.1532090

44        GLOBAL    MAXIMUM   0.1079349e-05   0.3306262e-24  0.1690930e-14  0.6646230e-15         0.       -0.4240792e-0
                    TIME      0.6128362       0.1532090       0.7660452e-01  0.7660452e-01         0.        0.6128362

24        GLOBAL    MAXIMUM          0.              0.              0.     0.2939942e-15         0.       -0.3643444e-0
                    TIME             0.              0.              0.     0.9192543             0.        0.6128362

25        GLOBAL    MAXIMUM  -0.7397933e-07          0.              0.     0.2943125e-15         0.        0.3968788e-0
                    TIME      0.1532090              0.              0.     0.9192543             0.        0.1532090

26        GLOBAL    MAXIMUM  -0.4593626e-07          0.              0.     0.2949493e-15         0.        0.2790922e-0
                    TIME      0.1532090              0.              0.     0.9192543             0.        0.1532090

27        GLOBAL    MAXIMUM  -0.6824760e-07          0.              0.     0.2959055e-15         0.        0.3753001e-0
                    TIME      0.1532090              0.              0.     0.9192543             0.        0.1532090

28        GLOBAL    MAXIMUM   0.7739772e-07          0.              0.     0.2971820e-15         0.       -0.4133844e-0
                    TIME      0.6128362              0.              0.     0.9192543             0.        0.6128362

29        GLOBAL    MAXIMUM  -0.5896207e-07          0.              0.     0.2987802e-15         0.        0.3354298e-0
                    TIME      0.1532090              0.              0.     0.9192543             0.        0.1532090

30        GLOBAL    MAXIMUM   0.7230424e-07          0.              0.     0.3007018e-15         0.       -0.3921296e-0
                    TIME      0.6128362              0.              0.     0.9192543             0.        0.6128362

31        GLOBAL    MAXIMUM   0.7525654e-07          0.              0.     0.3029490e-15         0.       -0.4046341e-0
                    TIME      0.6128362              0.              0.     0.9192543             0.        0.6128362

32        GLOBAL    MAXIMUM  -0.7005012e-07          0.              0.     0.3614307e-15         0.        0.3926083e-0
                    TIME      0.1532090              0.              0.     0.9192543             0.        0.1532090

33        GLOBAL    MAXIMUM  -0.5525006e-07          0.              0.     0.3084905e-15         0.        0.3192727e-0
                    TIME      0.1532090              0.              0.     0.9192543             0.        0.1532090

34        GLOBAL    MAXIMUM   0.7724637e-07          0.              0.     0.3117909e-15         0.        0.4053843e-0
                    TIME       1.225672              0.              0.     0.9192543             0.        0.1532090
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35	GLOBAL	MAXIMUM	0.	0.	0.	0.3154288e-15	0.	0.2573662e-0
		TIME	0.	0.	0.	0.9192543	0.	0.9192543
67	GLOBAL	MAXIMUM	0.	0.	0.	0.5698513e-17	0.	-0.3638827e-0
		TIME	0.	0.	0.	0.7660452e-01	0.	0.6128362
68	GLOBAL	MAXIMUM	-0.7290876e-07	0.	0.	0.5725206e-17	0.	0.3956332e-0
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
69	GLOBAL	MAXIMUM	-0.4644578e-07	0.	0.	0.5763796e-17	0.	0.2799398e-0
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
70	GLOBAL	MAXIMUM	-0.6800685e-07	0.	0.	0.5814363e-17	0.	0.3749153e-0
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
71	GLOBAL	MAXIMUM	0.7675059e-07	0.	0.	0.5877013e-17	0.	-0.4125301e-0
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
72	GLOBAL	MAXIMUM	-0.5911273e-07	0.	0.	0.5951875e-17	0.	0.3356605e-0
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
73	GLOBAL	MAXIMUM	0.7182094e-07	0.	0.	0.6039105e-17	0.	-0.3914529e-0
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
74	GLOBAL	MAXIMUM	0.7466277e-07	0.	0.	0.6138885e-17	0.	-0.4038195e-0
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
75	GLOBAL	MAXIMUM	-0.5911937e-07	0.	0.	0.6251421e-17	0.	0.3357213e-0
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
76	GLOBAL	MAXIMUM	-0.5548215e-07	0.	0.	0.6376949e-17	0.	0.3196614e-0
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
77	GLOBAL	MAXIMUM	0.7592834e-07	0.	0.	0.6515727e-17	0.	0.4043237e-0
		TIME	1.225672	0.	0.	0.7660452e-01	0.	0.1532090
78	GLOBAL	MAXIMUM	0.	0.	0.	0.6668046e-17	0.	0.2551467e-0
		TIME	0.	0.	0.	0.7660452e-01	0.	0.9192543
37	GLOBAL	MAXIMUM	0.	0.	-0.8411706e-13	-0.3675915e-14	0.	0.7269191e-1
		TIME	0.	0.	0.9192543	0.9192543	0.	0.9192543
40	GLOBAL	MAXIMUM	0.	0.	-0.1285052e-30	0.	0.	-0.1327927e-0
		TIME	0.	0.	0.9192543	0.	0.	0.6128362
41	GLOBAL	MAXIMUM	0.	0.	-0.7009425e-28	-0.3063119e-29	0.	0.7244069e-1
		TIME	0.	0.	0.9192543	0.9192543	0.	0.9192543
43	GLOBAL	MAXIMUM	0.	0.	-0.1829924e-14	-0.7996769e-16	0.	0.2552024e-0
		TIME	0.	0.	0.7660452e-01	0.7660452e-01	0.	0.9192543

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	0.1427735e-05	0.8850300e-23	0.8728463e-13	0.5237755e-24	-0.3451138e-06	-0.3202966e-0
		TIME	0.9958588	0.9958588	0.9192543	0.1532090	0.1532090	0.9958588
4	GLOBAL	MAXIMUM	-0.1155964e-05	-0.1182747e-22	0.8742634e-13	-0.3260658e-24	0.2646593e-06	0.3929160e-0
		TIME	0.1532090	0.1532090	0.9192543	0.7660452	0.7660452	0.1532090
6	GLOBAL	MAXIMUM	-0.1138360e-05	-0.1240218e-21	0.8766269e-13	0.6398305e-22	0.2928515e-06	0.3820690e-0
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.5362316	0.1532090
7	GLOBAL	MAXIMUM	-0.1180782e-05	-0.2315605e-21	0.8780455e-13	0.3451174e-13	0.	0.4368479e-0
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.	0.1532090
8	GLOBAL	MAXIMUM	0.1252075e-05	-0.1276499e-21	0.8799394e-13	-0.6364732e-22	0.9990938e-07	-0.4526768e-0
		TIME	0.6128362	0.9192543	0.9192543	0.9192543	2.910972	0.6128362
9	GLOBAL	MAXIMUM	0.1300859e-05	0.2509722e-23	0.8818333e-13	0.3466062e-13	0.	-0.4796221e-0
		TIME	0.6128362	0.6128362	0.9192543	0.9192543	0.	0.6128362
10	GLOBAL	MAXIMUM	-0.1190580e-05	-0.1246953e-22	0.8842045e-13	-0.3003456e-24	0.2349938e-06	0.4104301e-0
		TIME	0.1532090	0.1532090	0.9192543	0.9192543	0.9192543	0.1532090
12	GLOBAL	MAXIMUM	-0.1190930e-05	0.2240318e-21	0.8894268e-13	-0.1292358e-21	-0.2055933e-06	0.4107487e-0
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.9958588	0.1532090
13	GLOBAL	MAXIMUM	0.1233559e-05	0.4638998e-21	0.8922778e-13	0.3507114e-13	0.	-0.4555143e-0
		TIME	0.6128362	0.9192543	0.9192543	0.9192543	0.	0.6128362

14	GLOBAL	MAXIMUM	0.1355010e-05	0.9242346e-21	0.8956119e-13	-0.2618476e-21	0.1104457e-06	-0.4625848e-
		TIME	0.6128362	0.9192543	0.9192543	0.9192543	1.838509	0.6128362
15	GLOBAL	MAXIMUM	0.1273055e-05	0.1406550e-20	0.8989459e-13	0.3533323e-13	0.	-0.4696552e-
		TIME	0.6128362	0.9192543	0.9192543	0.9192543	0.	0.6128362
16	GLOBAL	MAXIMUM	-0.1189979e-05	0.1255423e-20	0.9027665e-13	0.7970368e-22	0.3161007e-06	0.4083902e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.9958588	0.1532090
18	GLOBAL	MAXIMUM	-0.1140244e-05	0.1511608e-20	0.9109883e-13	-0.2200487e-21	-0.5983207e-07	0.3800694e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	1.532090	0.1532090
20	GLOBAL	MAXIMUM	-0.1208881e-05	0.2396951e-20	0.9202860e-13	-0.2739133e-21	-0.2747830e-06	0.4214438e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	1.608695	0.1532090
21	GLOBAL	MAXIMUM	-0.1274559e-05	0.2897879e-20	0.9251826e-13	0.3636447e-13	0.	0.4697006e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.	0.1532090
22	GLOBAL	MAXIMUM	-0.1200606e-05	0.2417310e-20	0.9305799e-13	0.2617926e-21	0.3751171e-06	0.3805168e-
		TIME	0.9192543	0.9192543	0.9192543	0.9192543	0.2298136	0.9192543
23	GLOBAL	MAXIMUM	-0.7651716e-06	0.1955426e-20	0.9359773e-13	0.3678876e-13	-0.7719585e-29	0.3013406e-
		TIME	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543
45	GLOBAL	MAXIMUM	0.1430440e-05	-0.3730722e-22	0.1694890e-14	-0.5238042e-24	-0.3453122e-06	-0.3207978e-
		TIME	0.9958588	0.9958588	0.7660452e-01	0.1532090	0.1532090	0.9958588
46	GLOBAL	MAXIMUM	-0.1246318e-05	0.2216321e-23	0.1698850e-14	0.6677362e-15	-0.3919712e-29	0.4609890e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
47	GLOBAL	MAXIMUM	-0.1156397e-05	0.4676417e-22	0.1704576e-14	0.3260641e-24	0.2648505e-06	0.3938338e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452	0.7660452	0.1532090
48	GLOBAL	MAXIMUM	-0.8773467e-06	0.2047505e-23	0.1710301e-14	0.6722370e-15	-0.3928125e-29	0.3266786e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
49	GLOBAL	MAXIMUM	-0.1138861e-05	0.4679182e-22	0.1717804e-14	0.1322168e-23	0.2930674e-06	0.3819288e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.6128362	0.5362316	0.1532090
50	GLOBAL	MAXIMUM	-0.1180388e-05	-0.5694235e-23	0.1725306e-14	0.6781347e-15	-0.3940777e-29	0.4371790e-
		TIME	0.1532090	0.6128362	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
51	GLOBAL	MAXIMUM	0.1252190e-05	-0.5551586e-22	0.1734601e-14	-0.1252427e-23	0.9994315e-07	-0.4536741e-
		TIME	0.6128362	0.6128362	0.7660452e-01	0.7660452e-01	2.910972	0.6128362
52	GLOBAL	MAXIMUM	0.1300535e-05	-0.2509722e-23	0.1743896e-14	0.6854416e-15	-0.3957679e-29	-0.4808822e-
		TIME	0.6128362	0.6128362	0.7660452e-01	0.7660452e-01	0.9192543	0.6128362
53	GLOBAL	MAXIMUM	-0.1190961e-05	0.4886911e-22	0.1755003e-14	0.3003456e-24	0.2349481e-06	0.4103130e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.9192543	0.9192543	0.1532090
54	GLOBAL	MAXIMUM	-0.1055195e-05	0.2298117e-23	0.1766110e-14	0.6941729e-15	-0.3978851e-29	0.3915404e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
55	GLOBAL	MAXIMUM	-0.1191309e-05	0.4626015e-22	0.1779052e-14	-0.2602456e-23	-0.2056090e-06	0.4106466e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.9958588	0.1532090
56	GLOBAL	MAXIMUM	0.1233150e-05	0.9964863e-23	0.1791994e-14	0.7043466e-15	-0.4004314e-29	-0.4563691e-
		TIME	0.6128362	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.6128362
57	GLOBAL	MAXIMUM	0.1355471e-05	0.5663062e-22	0.1806798e-14	-0.5330208e-23	0.1104473e-06	-0.4635593e-
		TIME	0.6128362	0.9192543	0.7660452e-01	0.7660452e-01	1.838509	0.6128362
58	GLOBAL	MAXIMUM	0.1272633e-05	0.2915360e-22	0.1821602e-14	0.7159840e-15	-0.4034097e-29	-0.4707495e-
		TIME	0.6128362	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.6128362
59	GLOBAL	MAXIMUM	-0.1190352e-05	0.4169992e-22	0.1838299e-14	0.2549182e-23	0.3161415e-06	0.4107249e-
		TIME	0.1532090	0.9192543	0.7660452e-01	0.7660452e-01	0.9958588	0.1532090
60	GLOBAL	MAXIMUM	-0.1055329e-05	0.1997650e-22	0.1854995e-14	0.7291093e-15	-0.4068230e-29	0.3915695e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
61	GLOBAL	MAXIMUM	-0.1140750e-05	0.4173215e-22	0.1873619e-14	-0.5599938e-23	-0.5986107e-07	0.3822403e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	1.532090	0.1532090
62	GLOBAL	MAXIMUM	-0.1004129e-05	0.4013626e-22	0.1892243e-14	0.7437496e-15	-0.4107561e-29	0.3729111e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
63	GLOBAL	MAXIMUM	-0.1209198e-05	0.6253356e-22	0.1912833e-14	-0.5852029e-23	-0.2748497e-06	0.4220806e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	1.608695	0.1532090
64	GLOBAL	MAXIMUM	-0.1274141e-05	0.6120355e-22	0.1933423e-14	0.7599355e-15	-0.4151322e-29	0.4712500e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
65	GLOBAL	MAXIMUM	-0.1201473e-05	0.6241682e-22	0.1956022e-14	0.5481611e-23	0.3734859e-06	0.3794912e-
		TIME	0.9192543	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.2298136	0.9192543
66	GLOBAL	MAXIMUM	-0.7572554e-06	0.4146971e-22	0.1978621e-14	0.7777005e-15	0.	0.2977017e-

		TIME	0.9192543	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.	0.9192543
36	GLOBAL	MAXIMUM	-0.7625637e-06	0.1500999e-26	-0.7691237e-10	-0.3032510e-10	0.4549103e-25	0.3009756e-0
		TIME	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543
38	GLOBAL	MAXIMUM	0.1076817e-05	-0.1267987e-26	-0.5838809e-30	0.	0.	-0.4184196e-0
		TIME	0.6128362	0.6128362	0.9192543	0.	0.	0.6128362
39	GLOBAL	MAXIMUM	-0.7599282e-06	0.3517138e-24	-0.6409062e-25	-0.2526973e-25	-0.4543309e-25	0.2999355e-0
		TIME	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543
42	GLOBAL	MAXIMUM	-0.7572664e-06	0.7815528e-25	-0.2555888e-13	-0.9326709e-14	-0.1666197e-29	0.2976450e-0
		TIME	0.9192543	0.9192543	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
1	GLOBAL	MAXIMUM	-0.1175018e-02	-0.1953266e-21	0.7674996e-10	0.3016671e-10	0.	0.4603831e-03
		TIME	0.6128362	0.9958588	0.2298136	0.2298136	0.	0.6128362
3	GLOBAL	MAXIMUM	0.5933230e-03	0.1144564e-20	0.7683305e-10	0.3019937e-10	-0.3588286e-28	-0.2122762e-03
		TIME	0.1532090	0.1532090	0.2298136	0.2298136	0.2298136	0.1532090
5	GLOBAL	MAXIMUM	0.6483062e-03	0.1255582e-20	0.7699931e-10	0.3026472e-10	-0.3595797e-28	-0.2318643e-03
		TIME	0.9192543	0.1532090	0.2298136	0.2298136	0.2298136	0.9192543
11	GLOBAL	MAXIMUM	0.5906133e-03	0.1199275e-20	0.7799939e-10	0.3065781e-10	-0.3641403e-28	-0.2116035e-01
		TIME	0.1532090	0.1532090	0.2298136	0.2298136	0.2298136	0.1532090
17	GLOBAL	MAXIMUM	0.5853367e-03	0.9850653e-18	0.7975997e-10	0.3132521e-10	-0.3003225e-28	-0.2135941e-01
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
19	GLOBAL	MAXIMUM	0.6019008e-03	0.1682042e-17	0.8053437e-10	0.3165418e-10	-0.3757503e-28	-0.2157024e-01
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
44	GLOBAL	MAXIMUM	-0.1177328e-02	0.1930178e-21	-0.1187344e-11	-0.4666877e-12	-0.5122418e-28	0.4626023e-01
		TIME	0.6128362	0.9958588	0.3064181	0.3064181	0.3064181	0.6128362
24	GLOBAL	MAXIMUM	0.	0.	0.	0.2586510e-12	0.	0.3972276e-05
		TIME	0.	0.	0.	0.2298136	0.	0.6128362
25	GLOBAL	MAXIMUM	0.5228183e-04	0.	0.	0.2589310e-12	0.	-0.1826574e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
26	GLOBAL	MAXIMUM	0.5636508e-04	0.	0.	0.2594913e-12	0.	-0.2001664e-05
		TIME	0.9192543	0.	0.	0.2298136	0.	0.9192543
27	GLOBAL	MAXIMUM	0.4911063e-04	0.	0.	0.2603325e-12	0.	-0.1694535e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
28	GLOBAL	MAXIMUM	0.5201842e-04	0.	0.	0.2614556e-12	0.	-0.1833973e-0
		TIME	0.9192543	0.	0.	0.2298136	0.	0.9192543
29	GLOBAL	MAXIMUM	0.5207219e-04	0.	0.	0.2628616e-12	0.	-0.1815513e-0
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
30	GLOBAL	MAXIMUM	0.4995820e-04	0.	0.	0.2645523e-12	0.	-0.1728254e-0
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
31	GLOBAL	MAXIMUM	0.5002390e-04	0.	0.	0.2665293e-12	0.	-0.1730781e-0
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
32	GLOBAL	MAXIMUM	0.4140917e-04	0.	0.	0.3179805e-12	0.	-0.2168786e-0
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
33	GLOBAL	MAXIMUM	0.5294159e-04	0.	0.	0.2714046e-12	0.	-0.1850588e-0
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
34	GLOBAL	MAXIMUM	-0.5092574e-04	0.	0.	0.2743082e-12	0.	0.1750965e-0
		TIME	0.6128362	0.	0.	0.2298136	0.	0.6128362
35	GLOBAL	MAXIMUM	0.	0.	0.	0.2775088e-12	0.	0.2480400e-0
		TIME	0.	0.	0.	0.2298136	0.	0.2298136
67	GLOBAL	MAXIMUM	0.	0.	0.	-0.4001405e-14	0.	0.3968913e-0
		TIME	0.	0.	0.	0.3064181	0.	0.6128362
68	GLOBAL	MAXIMUM	0.5189700e-04	0.	0.	-0.4020148e-14	0.	-0.1823702e-0
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
69	GLOBAL	MAXIMUM	0.5601744e-04	0.	0.	-0.4047245e-14	0.	-0.1999391e-0

		TIME	0.9192543	0.	0.	0.3064181	0.	0.9192543
70	GLOBAL	MAXIMUM	0.4914941e-04	0.	0.	-0.4082753e-14	0.	-0.1694340e-0
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
71	GLOBAL	MAXIMUM	0.5187903e-04	0.	0.	-0.4126744e-14	0.	-0.1831817e-0
		TIME	0.9192543	0.	0.	0.3064181	0.	0.9192543
72	GLOBAL	MAXIMUM	0.5204245e-04	0.	0.	-0.4179312e-14	0.	-0.1815364e-0
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
73	GLOBAL	MAXIMUM	0.4996240e-04	0.	0.	-0.4240563e-14	0.	-0.1727819e-0
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
74	GLOBAL	MAXIMUM	0.5002103e-04	0.	0.	-0.4310627e-14	0.	-0.1730397e-0
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
75	GLOBAL	MAXIMUM	0.5164913e-04	0.	0.	-0.4389648e-14	0.	-0.1798924e-0
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
76	GLOBAL	MAXIMUM	0.5291714e-04	0.	0.	-0.4477792e-14	0.	-0.1851081e-0
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
77	GLOBAL	MAXIMUM	-0.5064310e-04	0.	0.	-0.4575240e-14	0.	0.1749371e-0
		TIME	0.6128362	0.	0.	0.3064181	0.	0.6128362
78	GLOBAL	MAXIMUM	0.	0.	0.	-0.4682195e-14	0.	0.2451964e-0
		TIME	0.	0.	0.	0.3064181	0.	0.2298136
37	GLOBAL	MAXIMUM	0.	0.	-0.7400474e-10	-0.3234007e-11	0.	0.6980023e-0
		TIME	0.	0.	0.2298136	0.2298136	0.	0.2298136
40	GLOBAL	MAXIMUM	0.	0.	-0.1143413e-27	-0.4996713e-29	0.	0.1448504e-0
		TIME	0.	0.	0.2298136	0.2298136	0.	0.6128362
41	GLOBAL	MAXIMUM	0.	0.	-0.6168164e-25	-0.2695487e-26	0.	0.6957596e-0
		TIME	0.	0.	0.2298136	0.2298136	0.	0.2298136
43	GLOBAL	MAXIMUM	0.	0.	0.1284944e-11	0.5615204e-13	0.	0.2451594e-0
		TIME	0.	0.	0.3064181	0.3064181	0.	0.2298136

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	-0.1416241e-02	-0.6967545e-20	0.7679151e-10	-0.2677557e-21	0.2741186e-03	0.2639644e-03
		TIME	0.6128362	0.6128362	0.2298136	0.1532090	0.6128362	0.6128362
4	GLOBAL	MAXIMUM	0.6432440e-03	0.6571550e-20	0.7691618e-10	-0.1237492e-21	0.1305508e-03	-0.2178045e-05
		TIME	0.1532090	0.1532090	0.2298136	0.9192543	0.9192543	0.1532090
6	GLOBAL	MAXIMUM	-0.7604878e-03	-0.1062914e-18	0.7712412e-10	0.5600418e-19	-0.5694887e-04	-0.2105953e-03
		TIME	0.6128362	0.2298136	0.2298136	0.2298136	0.5362316	0.1532090
7	GLOBAL	MAXIMUM	0.5522149e-03	-0.2026998e-18	0.7724893e-10	0.3036283e-10	-0.3607145e-28	-0.1978577e-03
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
8	GLOBAL	MAXIMUM	0.5951803e-03	-0.1056498e-18	0.7741555e-10	-0.5604743e-19	-0.2276763e-04	-0.2001505e-03
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	2.144927	0.1532090
9	GLOBAL	MAXIMUM	0.5955951e-03	0.1175790e-20	0.7758217e-10	0.3049381e-10	-0.3622341e-28	-0.2134074e-03
		TIME	0.9192543	0.9192543	0.2298136	0.2298136	0.2298136	0.9192543
10	GLOBAL	MAXIMUM	-0.6714543e-03	0.6278018e-20	0.7779078e-10	0.3587632e-22	-0.2892051e-04	-0.2070234e-03
		TIME	0.6128362	0.1532090	0.2298136	0.9192543	0.9192543	0.1532090
12	GLOBAL	MAXIMUM	-0.6480556e-03	0.2000690e-18	0.7825023e-10	-0.1139338e-18	0.2285589e-04	-0.2066237e-03
		TIME	1.378881	0.2298136	0.2298136	0.2298136	0.9958588	0.1532090
13	GLOBAL	MAXIMUM	0.5628821e-03	0.4092050e-18	0.7850106e-10	0.3085499e-10	-0.3664348e-28	-0.2016438e-03
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
14	GLOBAL	MAXIMUM	0.6751373e-03	0.8199621e-18	0.7879438e-10	-0.2304067e-18	-0.1405197e-04	-0.2017952e-03
		TIME	0.9192543	0.2298136	0.2298136	0.2298136	1.838509	0.1532090
15	GLOBAL	MAXIMUM	0.5637080e-03	0.1238669e-17	0.7908771e-10	0.3108557e-10	-0.3691203e-28	-0.2019466e-03
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
16	GLOBAL	MAXIMUM	-0.6301337e-03	0.1107887e-17	0.7942384e-10	0.7044537e-19	-0.3281051e-04	-0.2077704e-03
		TIME	1.378881	0.2298136	0.2298136	0.2298136	0.9958588	0.1532090
18	GLOBAL	MAXIMUM	-0.6677849e-03	0.1329339e-17	0.8014717e-10	-0.1936047e-18	-0.1658529e-04	-0.2146483e-03

		TIME	2.144927	0.2298136	0.2298136	0.2298136	1.378881	0.1532090
20	GLOBAL	MAXIMUM	0.6096979e-03	0.2112547e-17	0.8096517e-10	-0.2412840e-18	0.4149219e-04	-0.2077415e-0
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	1.608695	0.1532090
21	GLOBAL	MAXIMUM	-0.5700927e-03	0.2550663e-17	0.8139596e-10	0.3199283e-10	-0.3797019e-28	0.2039010e-0
		TIME	0.6128362	0.2298136	0.2298136	0.2298136	0.2298136	0.6128362
22	GLOBAL	MAXIMUM	0.7776490e-03	0.2130498e-17	0.8187081e-10	0.2305934e-18	-0.1035630e-03	-0.2310588e-0
		TIME	0.9192543	0.2298136	0.2298136	0.2298136	0.2298136	0.9192543
23	GLOBAL	MAXIMUM	-0.7345234e-03	0.1720527e-17	0.8234566e-10	0.3236611e-10	-0.6791557e-26	0.2881150e-0
		TIME	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136
45	GLOBAL	MAXIMUM	-0.1419590e-02	0.3036444e-19	-0.1190125e-11	0.2679268e-21	0.2751310e-03	0.2637545e-0
		TIME	0.6128362	0.6128362	0.3064181	0.1532090	0.6128362	0.6128362
46	GLOBAL	MAXIMUM	0.5929500e-03	-0.1144564e-20	-0.1192906e-11	-0.4688737e-12	-0.3408872e-26	-0.2126233e-0
		TIME	0.1532090	0.1532090	0.3064181	0.3064181	0.2298136	0.1532090
47	GLOBAL	MAXIMUM	0.6434026e-03	-0.2592699e-19	-0.1196926e-11	0.1237508e-21	0.1311596e-03	-0.2181883e-0
		TIME	0.1532090	0.1532090	0.3064181	0.9192543	0.9192543	0.1532090
48	GLOBAL	MAXIMUM	0.6490926e-03	-0.1255582e-20	-0.1200946e-11	-0.4720341e-12	-0.3416007e-26	-0.2330269e-0
		TIME	0.9192543	0.1532090	0.3064181	0.3064181	0.2298136	0.9192543
49	GLOBAL	MAXIMUM	-0.7613468e-03	-0.2497605e-19	-0.1206214e-11	0.9124007e-21	-0.5723003e-04	-0.2106944e-0
		TIME	0.6128362	0.1532090	0.3064181	0.2298136	0.5362316	0.1532090
50	GLOBAL	MAXIMUM	0.5519429e-03	0.2494383e-20	-0.1211482e-11	-0.4761754e-12	-0.3426787e-26	-0.1976354e-0
		TIME	0.1532090	0.3064181	0.3064181	0.3064181	0.2298136	0.1532090
51	GLOBAL	MAXIMUM	0.5953451e-03	-0.2371718e-19	-0.1218009e-11	0.8836355e-21	-0.2281283e-04	-0.1999925e-0
		TIME	0.1532090	0.1532090	0.3064181	0.3064181	2.144927	0.1532090
52	GLOBAL	MAXIMUM	0.5953737e-03	-0.1175790e-20	-0.1224536e-11	-0.4813062e-12	-0.3441224e-26	-0.2135964e-0
		TIME	0.9192543	0.9192543	0.3064181	0.3064181	0.2298136	0.9192543
53	GLOBAL	MAXIMUM	-0.6720825e-03	-0.2464406e-19	-0.1232335e-11	-0.3587632e-22	-0.2889749e-04	-0.2070313e-0
		TIME	0.6128362	0.1532090	0.3064181	0.9192543	0.9192543	0.1532090
54	GLOBAL	MAXIMUM	0.5907001e-03	-0.1199275e-20	-0.1240134e-11	-0.4874371e-12	-0.3459333e-26	-0.2117131e-0
		TIME	0.1532090	0.1532090	0.3064181	0.3064181	0.2298136	0.1532090
55	GLOBAL	MAXIMUM	-0.6486538e-03	0.2501999e-19	-0.1249222e-11	0.1837791e-20	0.2294237e-04	-0.2066190e-0
		TIME	1.378881	1.378881	0.3064181	0.3064181	0.9958588	0.1532090
56	GLOBAL	MAXIMUM	0.5626710e-03	0.7376259e-20	-0.1258310e-11	-0.4945810e-12	-0.3481131e-26	-0.2015250e-0
		TIME	0.1532090	0.2298136	0.3064181	0.3064181	0.2298136	0.1532090
57	GLOBAL	MAXIMUM	0.6757166e-03	0.3463282e-19	-0.1268705e-11	0.3741730e-20	-0.1407349e-04	-0.2016743e-0
		TIME	0.9192543	1.378881	0.3064181	0.3064181	1.838509	0.1532090
58	GLOBAL	MAXIMUM	0.5634921e-03	-0.2073647e-19	-0.1279100e-11	-0.5027526e-12	-0.3506643e-26	-0.2018236e-0
		TIME	0.1532090	0.3064181	0.3064181	0.3064181	0.2298136	0.1532090
59	GLOBAL	MAXIMUM	-0.6307392e-03	0.3661430e-19	-0.1290824e-11	-0.1805624e-20	-0.3291218e-04	-0.2058162e-0
		TIME	1.378881	1.378881	0.3064181	0.3064181	0.9958588	0.1532090
60	GLOBAL	MAXIMUM	0.5854452e-03	0.1428810e-19	-0.1302548e-11	-0.5119689e-12	-0.3535894e-26	-0.2098088e-0
		TIME	0.1532090	0.2298136	0.3064181	0.3064181	0.2298136	0.1532090
61	GLOBAL	MAXIMUM	-0.6683875e-03	0.4065235e-19	-0.1315625e-11	0.3939152e-20	-0.1667431e-04	-0.2128428e-0
		TIME	2.144927	0.2298136	0.3064181	0.3064181	1.378881	0.1532090
62	GLOBAL	MAXIMUM	0.6021706e-03	-0.2841712e-19	-0.1328703e-11	-0.5222491e-12	-0.3569628e-26	-0.2158768e-0
		TIME	0.1532090	0.3064181	0.3064181	0.3064181	0.2298136	0.1532090
63	GLOBAL	MAXIMUM	0.6098328e-03	0.5366087e-19	-0.1343161e-11	0.4114825e-20	0.4162300e-04	-0.2077641e-0
		TIME	0.1532090	1.378881	0.3064181	0.3064181	1.608695	0.1532090
64	GLOBAL	MAXIMUM	-0.5696948e-03	-0.4323048e-19	-0.1357619e-11	-0.5336146e-12	-0.3607168e-26	0.2039974e-0
		TIME	0.6128362	0.3064181	0.3064181	0.3064181	0.2298136	0.6128362
65	GLOBAL	MAXIMUM	0.7783923e-03	0.5913114e-19	-0.1373487e-11	-0.3896595e-20	-0.1017188e-03	-0.2296221e-0
		TIME	0.9192543	0.2298136	0.3064181	0.3064181	0.2298136	0.9192543
66	GLOBAL	MAXIMUM	-0.7274268e-03	-0.2920268e-19	-0.1389356e-11	-0.5460889e-12	0.2025406e-28	0.2858576e-0
		TIME	0.2298136	0.3064181	0.3064181	0.3064181	0.3064181	0.2298136
36	GLOBAL	MAXIMUM	-0.7322290e-03	0.1339965e-23	-0.6766617e-07	-0.2667950e-07	0.4002223e-22	0.2890029e-0
		TIME	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136
38	GLOBAL	MAXIMUM	-0.1174593e-02	0.1386752e-23	-0.5195251e-27	-0.1574426e-27	-0.8719042e-27	0.4564126e-0
		TIME	0.6128362	0.6128362	0.2298136	0.2298136	0.2298136	0.6128362
39	GLOBAL	MAXIMUM	-0.7298763e-03	0.3377893e-21	-0.5639855e-22	-0.2223689e-22	-0.3997125e-22	0.2880743e-0
		TIME	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136

```
 42        GLOBAL     MAXIMUM   -0.7274659e-03   0.7505057e-22   0.1794704e-10   0.6549066e-11   0.1169977e-26   0.2859318e-
                       TIME       0.2298136       0.2298136       0.3064181       0.3064181       0.3064181       0.2298136
 {  172} > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 {  172} > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 {  172} > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 {  172} >  $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 {  172} >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:26:45.5          Elapsed time: 0:53:54.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  10 pools of 524288 bytes total 5242880 bytes (3943%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 2, R_Get 70, R_Put 1, R_Del 1
 B_Read 4, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 1 TRAFFIC INDUCED VIBRATIONS
AMPLITUDE 0.000924 FREQUENCY 7.8324

**** ACTIVE UNITS - LENGTH WEIGHT ANGLE TEMPERATURE TIME
**** ASSUMED TO BE INCH POUND RADIAN FAHRENHEIT SECOND

```
{    2} > units m n
{    3} > type space frame
{    4} > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

```
{    5} > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

```
{    6} > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

```
{    7) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
{    8) > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
{    9) > joints coordinates
{   10) > 36 3.6 3.8 39.6 F
{   11) > 37 3.6 0.0 39.6 S
{   12) > 38 7.2 3.8 0.0 F
{   13) > 39 7.2 3.8 39.6 F
{   14) > 40 7.2 0.0 0.0 S
{   15) > 41 7.2 0.0 39.6 S
{   16) > 42 10.8 3.8 39.6 F
{   17) > 43 10.8 0.0 39.6 S
{   18) > member incidences
{   19) > 'b1' 1 2
{   20) > 'b2' 2 3
{   21) > 'b3' 3 4
{   22) > 'b4' 4 5
{   23) > 'b5' 5 6
{   24) > 'b6' 6 7
{   25) > 'b7' 7 8
{   26) > 'b8' 8 9
{   27) > 'b9' 9 10
{   28) > 'b10' 10 11
{   29) > 'b11' 11 12
{   30) > 'b12' 12 13
{   31) > 'b13' 13 14
{   32) > 'b14' 14 15
{   33) > 'b15' 15 16
{   34) > 'b16' 16 17
{   35) > 'b17' 17 18
{   36) > 'b18' 18 19
{   37) > 'b19' 19 20
{   38) > member incidences
{   39) > 'b20' 20 21
{   40) > 'b21' 21 22
{   41) > 'b22' 22 23
{   42) > 'ba23'  1 38
{   43) > 'ba24' 38 44
{   44) > 'bb25'  2 45
{   45) > 'bb26'  3 46
{   46) > 'bb27'  4 47
{   47) > 'bb28'  5 48
{   48) > 'bb29'  6 49
{   49) > 'bb30'  7 50
{   50) > 'bb31'  8 51
{   51) > 'bb32'  9 52
{   52) > 'bb33' 10 53
{   53) > 'bb34' 11 54
{   54) > 'bb35' 12 55
{   55) > 'bb36' 13 56
{   56) > 'bb37' 14 57
{   57) > 'bb38' 15 58
{   58) > 'bb39' 16 59
{   59) > 'bb40' 17 60
{   60) > 'bb41' 18 61
{   61) > member incidences
{   62) > 'bb42' 19 62
{   63) > 'bb43' 20 63
{   64) > 'bb44' 21 64
{   65) > 'bb45' 22 65
{   66) > 'bc46' 23 36
{   67) > 'bc47' 36 39
{   68) > 'bc48' 39 42
{   69) > 'bc49' 42 66
{   70) > 'bd50' 44 45
{   71) > 'bd51' 45 46
{   72) > 'bd52' 46 47
{   73) > 'bd53' 47 48
{   74) > 'bd54' 48 49
{   75) > 'bd55' 49 50
{   76) > 'bd56' 50 51
```

```
{   77} > 'bd57' 51 52
{   78} > 'bd58' 52 53
{   79} > 'bd59' 53 54
{   80} > 'bd60' 54 55
{   81} > 'bd61' 55 56
{   82} > 'bd62' 56 57
{   83} > 'bd63' 57 58
{   84} > 'bd64' 58 59
{   85} > 'bd65' 59 60
{   86} > 'bd66' 60 61
{   87} > 'bd67' 61 62
{   88} > 'bd68' 62 63
{   89} > 'bd69' 63 64
{   90} > 'bd70' 64 65
{   91} > member incidences
{   92} > 'bd71' 65 66
{   93} > 's72'  24  1
{   94} > 's73'  25  3
{   95} > 's74'  26  5
{   96} > 's75'  27  7
{   97} > 's76'  28  9
{   98} > 's77'  29 11
{   99} > 's78'  30 13
{  100} > 's79'  31 15
{  101} > 's80'  32 17
{  102} > 's81'  33 19
{  103} > 's82'  34 21
{  104} > 's83'  35 23
{  105} > 's84'  37 36
{  106} > 's85'  40 38
{  107} > 's86'  41 39
{  108} > 's87'  43 42
{  109} > 's88'  67 44
{  110} > 's89'  68 46
{  111} > 's90'  69 48
{  112} > 's91'  70 50
{  113} > 's92'  71 52
{  114} > 's93'  72 54
{  115} > 's94'  73 56
{  116} > 's95'  74 58
{  117} > 's96'  75 60
{  118} > 's97'  76 62
{  119} > 's98'  77 64
{  120} > 's99'  78 66
{  121} >
{  121} > joint releases
{  122} > 25 to 34 kfx 1.15E7
{  123} > 68 to 77 kfx 1.15E7
{  124} > 40 37 41 43 kfz 1.15E7
{  125} > 1 for y for z mom x mom y mom z kfx  3.2574E6
{  126} > 3 for y for z mom x mom y mom z kfx 7.0822E5
{  127} > 5 for y for z mom x mom y mom z kfx 2.1247E6
{  128} > 11 for y for z mom x mom y mom z kfx 7.0822E5
{  129} > 17 for y for z mom x mom y mom z kfx 7.0822E5
{  130} > 19 for y for z mom x mom y mom z kfx 1.11225E6
{  131} > 44 for x for y mom x mom y mom z kfz 1.11225E6
{  132} > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
{  133} > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
{  134} >
{  134} > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
{  135} >
{  135} > member releases
{  136} > 'bb25' to 'bb45' start           moment x y z end moment y z
{  137} > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
{  138} > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
{  139} > 'ba23' 'ba24' start mom x y z end mom z y
{  140} > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
{  141} > member eccentricities
{  142} > 'bb25' to 'bb45' start x 0.15
{  143} > member properties prismatic
{  144} > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
{  145} > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
{  146} > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
{  147} > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
{  148} > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
{  149} > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
{  150} > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
{  151} > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
{  152} > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
{  153} > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
{  154} > material constants
{  155} > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
{  156} > material concrete 's85' 's80' 'bb25' to 'bb45'
{  157} > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
{  158} > material steel 'bd50' to 'bd71'
{  159} > constants beta 0.0 all
{  160} > dead load 'dl' direction -y all members
{  161} > damping percents 2.5 50
```

```
( 162) > inertia of joints lumped
( 163) > dynamic degrees of freedom with static condensation
( 164) > generate  70 from joints translations x

( 165) >   dynamic loading 1
( 166) >   support acceleration
( 167) >   transl x function  sin ampl 0.000924 freq 49.21264679   phase 0.0
( 168) >   integrate from 0.0 to  20.00 at 0.07660452

( 169) >    end of dynamic loading
( 170) >    dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                        19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS      16.383
                                                ----------
                                                 35.690
                                                ==========



 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS     4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                         2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS       1.021
                                                ----------
                                                  3.572
                                                ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.43 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.40 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES     1.85 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.38 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.10 SECONDS
 TIME TO PROCESS   78 JOINTS                      3.90 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.23 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.60 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        9.80 SECONDS
 TIME FOR CONDENSATION                          231.70 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.35 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.10 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.60 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.15 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.23 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.11 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        93.98 SECONDS

 *************************
 * EIGEN-SOLUTION CHECKS *
 *************************
```

MODE	EIGENVALUE ((RAD/SEC)**2)	FREQUENCY (RAD/SEC)	FREQUENCY (CYC/SEC)	PERIOD (SEC/CYC)	ESTIMATED ACCURACY
1	6.727454d+01	8.202106d+00	1.305406d+00	7.660454d-01	1.682314d-10
2	6.954759d+01	8.339520d+00	1.327276d+00	7.534229d-01	1.715818d-10
3	7.757453d+01	8.807640d+00	1.401780d+00	7.133790d-01	5.332525d-11
4	8.785211d+01	9.372946d+00	1.491751d+00	6.703533d-01	1.053954d-10
5	9.546691d+01	9.770717d+00	1.555058d+00	6.430629d-01	9.126849d-11
6	1.111998d+02	1.054513d+01	1.678310d+00	5.958377d-01	4.898725d-11
7	1.195056d+02	1.093186d+01	1.739860d+00	5.747590d-01	4.387047d-11
8	1.396344d+02	1.181670d+01	1.880686d+00	5.317208d-01	4.177525d-11
9	1.677455d+02	1.295166d+01	2.061321d+00	4.851258d-01	1.219794d-12
10	2.066677d+02	1.437594d+01	2.288002d+00	4.370625d-01	3.011305d-11
11	4.878849d+02	2.208812d+01	3.515433d+00	2.844600d-01	2.553983d-11
12	8.257434d+02	2.873575d+01	4.573437d+00	2.186539d-01	1.439964d-12
13	1.399263d+03	3.740672d+01	5.953465d+00	1.679694d-01	1.660736d-12
14	1.500251d+03	3.873308d+01	6.164561d+00	1.622176d-01	7.436474d-12
15	1.649781d+03	4.061750d+01	6.464476d+00	1.546916d-01	7.459423d-12
16	1.838761d+03	4.288077d+01	6.824687d+00	1.465269d-01	1.807695d-12
17	2.046501d+03	4.523827d+01	7.199894d+00	1.388909d-01	4.440182d-13
18	2.254418d+03	4.748071d+01	7.556789d+00	1.323313d-01	2.205616d-12
19	2.446104d+03	4.945810d+01	7.871501d+00	1.270406d-01	3.810084d-12
20	2.586623d+03	5.085885d+01	8.094437d+00	1.235416d-01	2.089889d-12
21	2.674139d+03	5.171207d+01	8.230232d+00	1.215033d-01	2.045214d-12
22	3.563408d+03	5.969429d+01	9.500641d+00	1.052561d-01	3.623298d-13
23	4.780143d+03	6.913858d+01	1.100375d+01	9.087814d-02	1.458916d-12
24	2.609301d+04	1.615333d+02	2.570882d+01	3.889715d-02	2.697309d-13

25	2.806204d+04	1.675173d+02	2.666120d+01	3.750769d-02	2.082313d-13
26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 48.75 SECONDS

TIME TO COMPUTE TIME HISTORY RESPONSE 1016.60 SECONDS
(171) > list dynamic max dis max acc times all joints all
1

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - test1 TITLE - NONE GIVEN

ACTIVE UNITS M N RAD DEGF SEC

LOADING - 2

MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIO
1	GLOBAL	MAXIMUM	-0.1843093e-05	0.5659150e-24	-0.1492728e-12	-0.5867196e-13	0.	0.7217222e-
		TIME	0.6128362	0.1532090	0.9192543	0.9192543	0.	0.6128362
3	GLOBAL	MAXIMUM	0.2132294e-05	0.3792373e-23	-0.1494344e-12	-0.5873547e-13	0.	-0.7846166e-
		TIME	0.1532090	0.1532090	0.9192543	0.9192543	0.	0.1532090
5	GLOBAL	MAXIMUM	0.1499531e-05	0.3503509e-23	-0.1497578e-12	-0.5886257e-13	0.	-0.5600298e-
		TIME	0.1532090	0.1532090	0.9192543	0.9192543	0.	0.1532090
11	GLOBAL	MAXIMUM	0.1805213e-05	0.3932335e-23	-0.1517029e-12	-0.5962709e-13	0.	-0.6703657e-
		TIME	0.1532090	0.1532090	0.9192543	0.9192543	0.	0.1532090
17	GLOBAL	MAXIMUM	0.1805344e-05	-0.1915788e-20	-0.1551270e-12	-0.6092514e-13	0.	-0.6621178e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.	0.1532090
19	GLOBAL	MAXIMUM	0.1717387e-05	-0.3271287e-20	-0.1566332e-12	-0.6156497e-13	0.	-0.6385645e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.	0.1532090
44	GLOBAL	MAXIMUM	-0.1846886e-05	-0.5657384e-24	-0.2893369e-14	-0.1137244e-14	0.	0.7256465e-
		TIME	0.6128362	0.1532090	0.7660452e-01	0.7660452e-01	0.	0.6128362
24	GLOBAL	MAXIMUM	0.	0.	0.	-0.5030565e-15	0.	0.6234337e-
		TIME	0.	0.	0.	0.9192543	0.	0.6128362
25	GLOBAL	MAXIMUM	0.1265869e-06	0.	0.	-0.5036010e-15	0.	-0.6791038e-
		TIME	0.1532090	0.	0.	0.9192543	0.	0.1532090
26	GLOBAL	MAXIMUM	0.7860207e-07	0.	0.	-0.5046908e-15	0.	-0.4775579e-
		TIME	0.1532090	0.	0.	0.9192543	0.	0.1532090
27	GLOBAL	MAXIMUM	0.1167793e-06	0.	0.	-0.5063269e-15	0.	-0.6421804e-
		TIME	0.1532090	0.	0.	0.9192543	0.	0.1532090
28	GLOBAL	MAXIMUM	-0.1324346e-06	0.	0.	-0.5085111e-15	0.	0.7073401e-
		TIME	0.6128362	0.	0.	0.9192543	0.	0.6128362
29	GLOBAL	MAXIMUM	0.1008907e-06	0.	0.	-0.5112458e-15	0.	-0.5739578e-
		TIME	0.1532090	0.	0.	0.9192543	0.	0.1532090
30	GLOBAL	MAXIMUM	-0.1237191e-06	0.	0.	-0.5145340e-15	0.	0.6709707e-
		TIME	0.6128362	0.	0.	0.9192543	0.	0.6128362
31	GLOBAL	MAXIMUM	-0.1287708e-06	0.	0.	-0.5183791e-15	0.	0.6923673e-
		TIME	0.6128362	0.	0.	0.9192543	0.	0.6128362
32	GLOBAL	MAXIMUM	0.1198636e-06	0.	0.	-0.6184478e-15	0.	-0.6717967e-
		TIME	0.1532090	0.	0.	0.9192543	0.	0.1532090
33	GLOBAL	MAXIMUM	0.9453902e-07	0.	0.	-0.5278613e-15	0.	-0.5463112e-
		TIME	0.1532090	0.	0.	0.9192543	0.	0.1532090
34	GLOBAL	MAXIMUM	-0.1321805e-06	0.	0.	-0.5335086e-15	0.	-0.6936578e-
		TIME	1.225672	0.	0.	0.9192543	0.	0.1532090

35	GLOBAL	MAXIMUM	0.	0.	0.	-0.5397334e-15	0.	-0.4403815e-08
		TIME	0.	0.	0.	0.9192543	0.	0.9192543
67	GLOBAL	MAXIMUM	0.	0.	0.	-0.9750791e-17	0.	0.6226436e-08
		TIME	0.	0.	0.	0.7660452e-01	0.	0.6128362
68	GLOBAL	MAXIMUM	0.1247550e-06	0.	0.	-0.9796465e-17	0.	-0.6769725e-08
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
69	GLOBAL	MAXIMUM	0.7947392e-07	0.	0.	-0.9862497e-17	0.	-0.4790082e-08
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
70	GLOBAL	MAXIMUM	0.1163673e-06	0.	0.	-0.9949023e-17	0.	-0.6415218e-08
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
71	GLOBAL	MAXIMUM	-0.1313273e-06	0.	0.	-0.1005622e-16	0.	0.7058783e-08
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
72	GLOBAL	MAXIMUM	0.1011485e-06	0.	0.	-0.1018432e-16	0.	-0.5743525e-08
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
73	GLOBAL	MAXIMUM	-0.1228921e-06	0.	0.	-0.1033358e-16	0.	0.6698128e-08
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
74	GLOBAL	MAXIMUM	-0.1277548e-06	0.	0.	-0.1050432e-16	0.	0.6909734e-08
		TIME	0.6128362	0.	0.	0.7660452e-01	0.	0.6128362
75	GLOBAL	MAXIMUM	0.1011598e-06	0.	0.	-0.1069688e-16	0.	-0.5744565e-08
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
76	GLOBAL	MAXIMUM	0.9493615e-07	0.	0.	-0.1091167e-16	0.	-0.5469763e-08
		TIME	0.1532090	0.	0.	0.7660452e-01	0.	0.1532090
77	GLOBAL	MAXIMUM	-0.1299252e-06	0.	0.	-0.1114914e-16	0.	-0.6918429e-08
		TIME	1.225672	0.	0.	0.7660452e-01	0.	0.1532090
78	GLOBAL	MAXIMUM	0.	0.	0.	-0.1140977e-16	0.	-0.4365837e-08
		TIME	0.	0.	0.	0.7660452e-01	0.	0.9192543
37	GLOBAL	MAXIMUM	0.	0.	0.1439336e-12	0.6289896e-14	0.	-0.1243838e-09
		TIME	0.	0.	0.9192543	0.9192543	0.	0.9192543
40	GLOBAL	MAXIMUM	0.	0.	0.2198865e-30	0.	0.	0.2272229e-07
		TIME	0.	0.	0.9192543	0.	0.	0.6128362
41	GLOBAL	MAXIMUM	0.	0.	0.1199390e-27	0.5241333e-29	0.	-0.1239539e-09
		TIME	0.	0.	0.9192543	0.9192543	0.	0.9192543
43	GLOBAL	MAXIMUM	0.	0.	0.3131205e-14	0.1368336e-15	0.	-0.4366790e-08
		TIME	0.	0.	0.7660452e-01	0.7660452e-01	0.	0.9192543

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	-0.2443013e-05	-0.1514384e-22	-0.1493536e-12	-0.8962384e-24	0.5905282e-06	0.5480629e-0
		TIME	0.9958588	0.9958588	0.9192543	0.1532090	0.1532090	0.9958588
4	GLOBAL	MAXIMUM	0.1977983e-05	0.2023811e-22	-0.1495961e-12	0.5579344e-24	-0.4528620e-06	-0.6723232e-0
		TIME	0.1532090	0.1532090	0.9192543	0.7660452	0.7660452	0.1532090
6	GLOBAL	MAXIMUM	0.1947862e-05	0.2122150e-21	-0.1500005e-12	-0.1094820e-21	-0.5011002e-06	-0.6537626e-0
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.5362316	0.1532090
7	GLOBAL	MAXIMUM	0.2020450e-05	0.3962255e-21	-0.1502433e-12	-0.5905339e-13	0.	-0.7474955e-0
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.	0.1532090
8	GLOBAL	MAXIMUM	-0.2142417e-05	0.2184231e-21	-0.1505673e-12	0.1089076e-21	-0.1709612e-06	0.7745725e-0
		TIME	0.6128362	0.9192543	0.9192543	0.9192543	2.910972	0.6128362
9	GLOBAL	MAXIMUM	-0.2225893e-05	-0.4294371e-23	-0.1508914e-12	-0.5930814e-13	0.	0.8206791e-0
		TIME	0.6128362	0.6128362	0.9192543	0.9192543	0.	0.6128362
10	GLOBAL	MAXIMUM	0.2037215e-05	0.2133676e-22	-0.1512971e-12	0.5139258e-24	-0.4021015e-06	-0.7022917e-0
		TIME	0.1532090	0.1532090	0.9192543	0.9192543	0.9192543	0.1532090
12	GLOBAL	MAXIMUM	0.2037815e-05	-0.3833430e-21	-0.1521907e-12	0.2211367e-21	0.3517925e-06	-0.7028368e-0
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.9958588	0.1532090
13	GLOBAL	MAXIMUM	-0.2110735e-05	-0.7937837e-21	-0.1526786e-12	-0.6001059e-13	0.	0.7794279e-0
		TIME	0.6128362	0.9192543	0.9192543	0.9192543	0.	0.6128362

14	GLOBAL	MAXIMUM	-0.2318550e-05	-0.1581467e-20	-0.1532491e-12	0.4480501e-21	-0.1889845e-06	0.7915262e-
		TIME	0.6128362	0.9192543	0.9192543	0.9192543	1.838509	0.6128362
15	GLOBAL	MAXIMUM	-0.2178317e-05	-0.2406763e-20	-0.1538195e-12	-0.6045906e-13	0.	0.8036246e-
		TIME	0.6128362	0.9192543	0.9192543	0.9192543	0.	0.6128362
16	GLOBAL	MAXIMUM	0.2036186e-05	-0.2148167e-20	-0.1544733e-12	-0.1363818e-21	-0.5408833e-06	-0.6988012e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.9958588	0.1532090
18	GLOBAL	MAXIMUM	0.1951084e-05	-0.2586528e-20	-0.1558801e-12	0.3765276e-21	0.1023783e-06	-0.6503412e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	1.532090	0.1532090
20	GLOBAL	MAXIMUM	0.2068530e-05	-0.4101447e-20	-0.1574711e-12	0.4686958e-21	0.4701950e-06	-0.7211373e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	1.608695	0.1532090
21	GLOBAL	MAXIMUM	0.2180913e-05	-0.4958590e-20	-0.1583089e-12	-0.6222361e-13	0.	-0.8037102e-
		TIME	0.1532090	0.9192543	0.9192543	0.9192543	0.	0.1532090
22	GLOBAL	MAXIMUM	0.2054374e-05	-0.4136283e-20	-0.1592325e-12	-0.4479559e-21	-0.6418673e-06	-0.6511078e-
		TIME	0.9192543	0.9192543	0.9192543	0.9192543	0.2298136	0.9192543
23	GLOBAL	MAXIMUM	0.1309292e-05	-0.3345949e-20	-0.1601560e-12	-0.6294962e-13	0.1320906e-28	-0.5156265e-
		TIME	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543
45	GLOBAL	MAXIMUM	-0.2447642e-05	0.6383679e-22	-0.2900146e-14	0.8962874e-24	0.5908676e-06	0.5489205e-
		TIME	0.9958588	0.9958588	0.7660452e-01	0.1532090	0.1532090	0.9958588
46	GLOBAL	MAXIMUM	0.2132590e-05	-0.3792373e-23	-0.2906922e-14	-0.1142571e-14	0.6707059e-29	-0.7888036e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
47	GLOBAL	MAXIMUM	0.1978724e-05	-0.8001872e-22	-0.2916719e-14	-0.5579316e-24	-0.4531892e-06	-0.6738936e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452	0.7660452	0.1532090
48	GLOBAL	MAXIMUM	0.1501238e-05	-0.3503509e-23	-0.2926516e-14	-0.1150272e-14	0.6721456e-29	-0.5589836e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
49	GLOBAL	MAXIMUM	0.1948719e-05	-0.8006602e-22	-0.2939353e-14	-0.2262368e-23	-0.5014696e-06	-0.6535228e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.6128362	0.5362316	0.1532090
50	GLOBAL	MAXIMUM	0.2019775e-05	0.9743412e-23	-0.2952191e-14	-0.1160364e-14	0.6743104e-29	-0.7480621e-
		TIME	0.1532090	0.6128362	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
51	GLOBAL	MAXIMUM	-0.2142614e-05	0.9499287e-22	-0.2968096e-14	0.2143042e-23	-0.1710189e-06	0.7762790e-
		TIME	0.6128362	0.6128362	0.7660452e-01	0.7660452e-01	2.910972	0.6128362
52	GLOBAL	MAXIMUM	-0.2225338e-05	0.4294371e-23	-0.2984001e-14	-0.1172867e-14	0.6772025e-29	0.8228353e-
		TIME	0.6128362	0.6128362	0.7660452e-01	0.7660452e-01	0.9192543	0.6128362
53	GLOBAL	MAXIMUM	0.2037867e-05	-0.8362050e-22	-0.3003006e-14	-0.5139258e-24	-0.4020233e-06	-0.7020914e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.9192543	0.9192543	0.1532090
54	GLOBAL	MAXIMUM	0.1805557e-05	-0.3932335e-23	-0.3022011e-14	-0.1187807e-14	0.6808252e-29	-0.6699692e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
55	GLOBAL	MAXIMUM	0.2038462e-05	-0.7915627e-22	-0.3044157e-14	0.4453092e-23	0.3518195e-06	-0.7026622e-
		TIME	0.1532090	0.1532090	0.7660452e-01	0.7660452e-01	0.9958588	0.1532090
56	GLOBAL	MAXIMUM	-0.2110036e-05	-0.1705099e-22	-0.3066302e-14	-0.1205216e-14	0.6851823e-29	0.7808906e-
		TIME	0.6128362	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.6128362
57	GLOBAL	MAXIMUM	-0.2319340e-05	-0.9690164e-22	-0.3091633e-14	0.9120580e-23	-0.1889874e-06	0.7931938e-
		TIME	0.6128362	0.9192543	0.7660452e-01	0.7660452e-01	1.838509	0.6128362
58	GLOBAL	MAXIMUM	-0.2177596e-05	-0.4988505e-22	-0.3116964e-14	-0.1225128e-14	0.6902784e-29	0.8054971e-
		TIME	0.6128362	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.6128362
59	GLOBAL	MAXIMUM	0.2036825e-05	-0.7135339e-22	-0.3145534e-14	-0.4361934e-23	-0.5409531e-06	-0.7027961e-
		TIME	0.1532090	0.9192543	0.7660452e-01	0.7660452e-01	0.9958588	0.1532090
60	GLOBAL	MAXIMUM	0.1805786e-05	-0.3418202e-22	-0.3174104e-14	-0.1247587e-14	0.6961191e-29	-0.6700192e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
61	GLOBAL	MAXIMUM	0.1951950e-05	-0.7140835e-22	-0.3205971e-14	0.9582118e-23	0.1024279e-06	-0.6540559e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	1.532090	0.1532090
62	GLOBAL	MAXIMUM	0.1718177e-05	-0.6867762e-22	-0.3237839e-14	-0.1272638e-14	0.7028490e-29	-0.6380926e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
63	GLOBAL	MAXIMUM	0.2069073e-05	-0.1070019e-21	-0.3273071e-14	0.1001347e-22	0.4703091e-06	-0.7222270e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	1.608695	0.1532090
64	GLOBAL	MAXIMUM	0.2180198e-05	-0.1047261e-21	-0.3308302e-14	-0.1300334e-14	0.7103370e-29	-0.8063613e-
		TIME	0.1532090	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543	0.1532090
65	GLOBAL	MAXIMUM	0.2055857e-05	-0.1068021e-21	-0.3346971e-14	-0.9379648e-23	-0.6390760e-06	-0.6493530e-
		TIME	0.9192543	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.2298136	0.9192543
66	GLOBAL	MAXIMUM	0.1295746e-05	-0.7095930e-22	-0.3385641e-14	-0.1330732e-14	0.	-0.5094000e-

		TIME	0.9192543	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.	0.9192543
36	GLOBAL	MAXIMUM	0.1304829e-05	-0.2568374e-26	0.1316055e-09	0.5188959e-10	-0.7784017e-25	-0.5150020e-06
		TIME	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543
38	GLOBAL	MAXIMUM	-0.1842553e-05	0.2169666e-26	0.9990844e-30	0.	0.1695787e-29	0.7159623e-06
		TIME	0.6128362	0.6128362	0.9192543	0.	0.9192543	0.6128362
39	GLOBAL	MAXIMUM	0.1300320e-05	-0.6018205e-24	0.1096661e-24	0.4323929e-25	0.7774102e-25	-0.5132222e-06
		TIME	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543	0.9192543
42	GLOBAL	MAXIMUM	0.1295765e-05	-0.1337322e-24	0.4373409e-13	0.1595904e-13	0.2851048e-29	-0.5093029e-06
		TIME	0.9192543	0.9192543	0.7660452e-01	0.7660452e-01	0.7660452e-01	0.9192543

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
1	GLOBAL	MAXIMUM	0.2010586e-02	0.3342255e-21	-0.1313277e-09	-0.5161860e-10	0.	-0.7877666e-03
		TIME	0.6128362	0.9958588	0.2298136	0.2298136	0.	0.6128362
3	GLOBAL	MAXIMUM	-0.1015242e-02	-0.1958476e-20	-0.1314699e-09	-0.5167447e-10	0.6139955e-28	0.3632282e-03
		TIME	0.1532090	0.1532090	0.2298136	0.2298136	0.2298136	0.1532090
5	GLOBAL	MAXIMUM	-0.1109326e-02	-0.2148441e-20	-0.1317544e-09	-0.5178629e-10	0.6152807e-28	0.3967465e-03
		TIME	0.9192543	0.1532090	0.2298136	0.2298136	0.2298136	0.9192543
11	GLOBAL	MAXIMUM	-0.1010605e-02	-0.2052093e-20	-0.1334656e-09	-0.5245891e-10	0.6230844e-28	0.3620772e-03
		TIME	0.1532090	0.1532090	0.2298136	0.2298136	0.2298136	0.1532090
17	GLOBAL	MAXIMUM	-0.1001576e-02	-0.1685556e-17	-0.1364782e-09	-0.5360091e-10	0.5138852e-28	0.3654833e-03
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
19	GLOBAL	MAXIMUM	-0.1029919e-02	-0.2878160e-17	-0.1378032e-09	-0.5416382e-10	0.6429505e-28	0.3690909e-03
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
44	GLOBAL	MAXIMUM	0.2014539e-02	-0.3302749e-21	0.2031677e-11	0.7985544e-12	0.8765025e-28	-0.7915640e-03
		TIME	0.6128362	0.9958588	0.3064181	0.3064181	0.3064181	0.6128362
24	GLOBAL	MAXIMUM	0.	0.	0.	-0.4425806e-12	0.	-0.6797006e-05
		TIME	0.	0.	0.	0.2298136	0.	0.6128362
25	GLOBAL	MAXIMUM	-0.8946003e-04	0.	0.	-0.4430597e-12	0.	0.3125471e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
26	GLOBAL	MAXIMUM	-0.9644712e-04	0.	0.	-0.4440184e-12	0.	0.3425077e-05
		TIME	0.9192543	0.	0.	0.2298136	0.	0.9192543
27	GLOBAL	MAXIMUM	-0.8403376e-04	0.	0.	-0.4454578e-12	0.	0.2899538e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
28	GLOBAL	MAXIMUM	-0.8900946e-04	0.	0.	-0.4473795e-12	0.	0.3138138e-05
		TIME	0.9192543	0.	0.	0.2298136	0.	0.9192543
29	GLOBAL	MAXIMUM	-0.8910131e-04	0.	0.	-0.4497854e-12	0.	0.3106545e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
30	GLOBAL	MAXIMUM	-0.8548404e-04	0.	0.	-0.4526783e-12	0.	0.2957234e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
31	GLOBAL	MAXIMUM	-0.8559645e-04	0.	0.	-0.4560612e-12	0.	0.2961559e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
32	GLOBAL	MAXIMUM	-0.7085570e-04	0.	0.	-0.5440999e-12	0.	0.3711035e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
33	GLOBAL	MAXIMUM	-0.9058896e-04	0.	0.	-0.4644035e-12	0.	0.3166562e-05
		TIME	0.1532090	0.	0.	0.2298136	0.	0.1532090
34	GLOBAL	MAXIMUM	0.8713942e-04	0.	0.	-0.4693718e-12	0.	-0.2996089e-0
		TIME	0.6128362	0.	0.	0.2298136	0.	0.6128362
35	GLOBAL	MAXIMUM	0.	0.	0.	-0.4748483e-12	0.	-0.4244240e-0
		TIME	0.	0.	0.	0.2298136	0.	0.2298136
67	GLOBAL	MAXIMUM	0.	0.	0.	0.6846848e-14	0.	-0.6791252e-05
		TIME	0.	0.	0.	0.3064181	0.	0.6128362
68	GLOBAL	MAXIMUM	-0.8880155e-04	0.	0.	0.6878919e-14	0.	0.3120557e-05
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
69	GLOBAL	MAXIMUM	-0.9585228e-04	0.	0.	0.6925286e-14	0.	0.3421188e-05

		TIME	0.9192543	0.	0.	0.3064181	0.	0.9192543
70	GLOBAL	MAXIMUM	-0.8410012e-04	0.	0.	0.6986043e-14	0.	0.2899204e-
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
71	GLOBAL	MAXIMUM	-0.8877095e-04	0.	0.	0.7061318e-14	0.	0.3134447e-
		TIME	0.9192543	0.	0.	0.3064181	0.	0.9192543
72	GLOBAL	MAXIMUM	-0.8905043e-04	0.	0.	0.7151266e-14	0.	0.3106290e-
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
73	GLOBAL	MAXIMUM	-0.8549123e-04	0.	0.	0.7256074e-14	0.	0.2956490e-
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
74	GLOBAL	MAXIMUM	-0.8559155e-04	0.	0.	0.7375961e-14	0.	0.2960902e-
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
75	GLOBAL	MAXIMUM	-0.8837740e-04	0.	0.	0.7511176e-14	0.	0.3078159e-
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
76	GLOBAL	MAXIMUM	-0.9054711e-04	0.	0.	0.7661998e-14	0.	0.3167406e-
		TIME	0.1532090	0.	0.	0.3064181	0.	0.1532090
77	GLOBAL	MAXIMUM	0.8665580e-04	0.	0.	0.7828743e-14	0.	-0.2993362e-
		TIME	0.6128362	0.	0.	0.3064181	0.	0.6128362
78	GLOBAL	MAXIMUM	0.	0.	0.	0.8011756e-14	0.	-0.4195582e-
		TIME	0.	0.	0.	0.3064181	0.	0.2298136
37	GLOBAL	MAXIMUM	0.	0.	0.1266303e-09	0.5533744e-11	0.	-0.1194359e-
		TIME	0.	0.	0.2298136	0.2298136	0.	0.2298136
40	GLOBAL	MAXIMUM	0.	0.	0.1956506e-27	0.8549930e-29	0.	-0.2478551e-
		TIME	0.	0.	0.2298136	0.2298136	0.	0.6128362
41	GLOBAL	MAXIMUM	0.	0.	0.1055441e-24	0.4612278e-26	0.	-0.1190522e-
		TIME	0.	0.	0.2298136	0.2298136	0.	0.2298136
43	GLOBAL	MAXIMUM	0.	0.	-0.2198681e-11	-0.9608237e-13	0.	-0.4194950e-
		TIME	0.	0.	0.3064181	0.3064181	0.	0.2298136

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			/----------TRANS----------//			----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIC
2	GLOBAL	MAXIMUM	0.2423344e-02	0.1192223e-19	-0.1313988e-09	0.4581598e-21	-0.4690480e-03	-0.4516720e-
		TIME	0.6128362	0.6128362	0.2298136	0.1532090	0.6128362	0.6128362
4	GLOBAL	MAXIMUM	-0.1100662e-02	-0.1124465e-19	-0.1316121e-09	0.2117491e-21	-0.2233873e-03	0.3726878e-
		TIME	0.1532090	0.1532090	0.2298136	0.9192543	0.9192543	0.1532090
6	GLOBAL	MAXIMUM	0.1301277e-02	0.1818764e-18	-0.1319679e-09	-0.9582937e-19	0.9744606e-04	0.3603520e-
		TIME	0.6128362	0.2298136	0.2298136	0.2298136	0.5362316	0.1532090
7	GLOBAL	MAXIMUM	-0.9449010e-03	0.3468418e-18	-0.1321815e-09	-0.5195417e-10	0.6172225e-28	0.3385566e-
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
8	GLOBAL	MAXIMUM	-0.1018420e-02	0.1807786e-18	-0.1324666e-09	0.9590337e-19	0.3895840e-04	0.3424798e-
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	2.144927	0.1532090
9	GLOBAL	MAXIMUM	-0.1019131e-02	-0.2011911e-20	-0.1327517e-09	-0.5217830e-10	0.6198228e-28	0.3651645e-
		TIME	0.9192543	0.9192543	0.2298136	0.2298136	0.2298136	0.9192543
10	GLOBAL	MAXIMUM	0.1148931e-02	-0.1074239e-19	-0.1331087e-09	-0.6138837e-22	0.4948622e-04	0.3542400e-
		TIME	0.6128362	0.1532090	0.2298136	0.9192543	0.9192543	0.1532090
12	GLOBAL	MAXIMUM	0.1108895e-02	-0.3423403e-18	-0.1338948e-09	0.1949533e-18	-0.3910889e-04	0.3535561e-
		TIME	1.378881	0.2298136	0.2298136	0.2298136	0.9958588	0.1532090
13	GLOBAL	MAXIMUM	-0.9631540e-03	-0.7001951e-18	-0.1343240e-09	-0.5279630e-10	0.6270107e-28	0.3450350e-
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
14	GLOBAL	MAXIMUM	-0.1155237e-02	-0.1403046e-17	-0.1348259e-09	0.3942515e-18	0.2404439e-04	0.3452941e-
		TIME	0.9192543	0.2298136	0.2298136	0.2298136	1.838509	0.1532090
15	GLOBAL	MAXIMUM	-0.9645671e-03	-0.2119499e-17	-0.1353278e-09	-0.5319086e-10	0.6316058e-28	0.3455532e-
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	0.2298136	0.1532090
16	GLOBAL	MAXIMUM	0.1078229e-02	-0.1895718e-17	-0.1359030e-09	-0.1205398e-18	0.5614238e-04	0.3555182e-
		TIME	1.378881	0.2298136	0.2298136	0.2298136	0.9958588	0.1532090
18	GLOBAL	MAXIMUM	0.1142655e-02	-0.2274647e-17	-0.1371407e-09	0.3312791e-18	0.2837907e-04	0.3672871e-

		TIME	2.144927	0.2298136	0.2298136	0.2298136	1.378881	0.1532090
20	GLOBAL	MAXIMUM	-0.1043261e-02	-0.3614802e-17	-0.1385404e-09	0.4128636e-18	-0.7099762e-04	0.3554687e-0
		TIME	0.1532090	0.2298136	0.2298136	0.2298136	1.608695	0.1532090
21	GLOBAL	MAXIMUM	0.9754897e-03	-0.4364468e-17	-0.1392775e-09	-0.5474328e-10	0.6497120e-28	-0.3488964e-0
		TIME	0.6128362	0.2298136	0.2298136	0.2298136	0.2298136	0.6128362
22	GLOBAL	MAXIMUM	-0.1330645e-02	-0.3645519e-17	-0.1400900e-09	-0.3945710e-18	0.1772079e-03	0.3953675e-0
		TIME	0.9192543	0.2298136	0.2298136	0.2298136	0.2298136	0.9192543
23	GLOBAL	MAXIMUM	0.1256851e-02	-0.2944012e-17	-0.1409026e-09	-0.5538201e-10	0.1162111e-25	-0.4929968e-0
		TIME	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136
45	GLOBAL	MAXIMUM	0.2429075e-02	-0.5195687e-19	0.2036435e-11	-0.4584526e-21	-0.4707804e-03	-0.4513129e-0
		TIME	0.6128362	0.6128362	0.3064181	0.1532090	0.6128362	0.6128362
46	GLOBAL	MAXIMUM	-0.1014603e-02	0.1958476e-20	0.2041194e-11	0.8022950e-12	0.5832958e-26	0.3638222e-0
		TIME	0.1532090	0.1532090	0.3064181	0.3064181	0.2298136	0.1532090
47	GLOBAL	MAXIMUM	-0.1100934e-02	0.4436397e-19	0.2048073e-11	-0.2117518e-21	-0.2244289e-03	0.3733445e-0
		TIME	0.1532090	0.1532090	0.3064181	0.9192543	0.9192543	0.1532090
48	GLOBAL	MAXIMUM	-0.1110672e-02	0.2148441e-20	0.2054952e-11	0.8077027e-12	0.5845167e-26	0.3987359e-0
		TIME	0.9192543	0.1532090	0.3064181	0.3064181	0.2298136	0.9192543
49	GLOBAL	MAXIMUM	0.1302747e-02	0.4273681e-19	0.2063966e-11	-0.1561219e-20	0.9792716e-04	0.3605215e-0
		TIME	0.6128362	0.1532090	0.3064181	0.2298136	0.5362316	0.1532090
50	GLOBAL	MAXIMUM	-0.9444356e-03	-0.4268167e-20	0.2072981e-11	0.8147889e-12	0.5863613e-26	0.3381762e-0
		TIME	0.1532090	0.3064181	0.3064181	0.3064181	0.2298136	0.1532090
51	GLOBAL	MAXIMUM	-0.1018702e-02	0.4058274e-19	0.2084149e-11	-0.1511998e-20	0.3903574e-04	0.3422094e-0
		TIME	0.1532090	0.1532090	0.3064181	0.3064181	2.144927	0.1532090
52	GLOBAL	MAXIMUM	-0.1018752e-02	0.2011911e-20	0.2095317e-11	0.8235682e-12	0.5888316e-26	0.3654878e-0
		TIME	0.9192543	0.9192543	0.3064181	0.3064181	0.2298136	0.9192543
53	GLOBAL	MAXIMUM	0.1150006e-02	0.4216873e-19	0.2108662e-11	0.6138837e-22	0.4944683e-04	0.3542536e-0
		TIME	0.6128362	0.1532090	0.3064181	0.9192543	0.9192543	0.1532090
54	GLOBAL	MAXIMUM	-0.1010754e-02	0.2052093e-20	0.2122008e-11	0.8340590e-12	0.5919302e-26	0.3622646e-0
		TIME	0.1532090	0.1532090	0.3064181	0.3064181	0.2298136	0.1532090
55	GLOBAL	MAXIMUM	0.1109919e-02	-0.4281198e-19	0.2137558e-11	-0.3144664e-20	-0.3925687e-04	0.3535482e-0
		TIME	1.378881	1.378881	0.3064181	0.3064181	0.9958588	0.1532090
56	GLOBAL	MAXIMUM	-0.9627927e-03	-0.1262160e-19	0.2153108e-11	0.8462829e-12	0.5956601e-26	0.3448317e-0
		TIME	0.1532090	0.2298136	0.3064181	0.3064181	0.2298136	0.1532090
57	GLOBAL	MAXIMUM	-0.1156228e-02	-0.5926061e-19	0.2170895e-11	-0.6402515e-20	0.2408122e-04	0.3450872e-0
		TIME	0.9192543	1.378881	0.3064181	0.3064181	1.838509	0.1532090
58	GLOBAL	MAXIMUM	-0.9641977e-03	0.3548240e-19	0.2188682e-11	0.8602654e-12	0.6000255e-26	0.3453427e-0
		TIME	0.1532090	0.3064181	0.3064181	0.3064181	0.2298136	0.1532090
59	GLOBAL	MAXIMUM	0.1079265e-02	-0.6265111e-19	0.2208743e-11	0.3089623e-20	0.5631634e-04	0.3521744e-0
		TIME	1.378881	1.378881	0.3064181	0.3064181	0.9958588	0.1532090
60	GLOBAL	MAXIMUM	-0.1001762e-02	-0.2444853e-19	0.2228804e-11	0.8760356e-12	0.6050307e-26	0.3590062e-0
		TIME	0.1532090	0.2298136	0.3064181	0.3064181	0.2298136	0.1532090
61	GLOBAL	MAXIMUM	0.1143686e-02	-0.6956069e-19	0.2251181e-11	-0.6740326e-20	0.2853139e-04	0.3641977e-0
		TIME	2.144927	0.2298136	0.3064181	0.3064181	1.378881	0.1532090
62	GLOBAL	MAXIMUM	-0.1030381e-02	0.4862484e-19	0.2273558e-11	0.8936262e-12	0.6108030e-26	0.3693892e-0
		TIME	0.1532090	0.3064181	0.3064181	0.3064181	0.2298136	0.1532090
63	GLOBAL	MAXIMUM	-0.1043492e-02	-0.9181966e-19	0.2298297e-11	-0.7040923e-20	-0.7122144e-04	0.3555075e-0
		TIME	0.1532090	1.378881	0.3064181	0.3064181	1.608695	0.1532090
64	GLOBAL	MAXIMUM	0.9748089e-03	0.7397214e-19	0.2323036e-11	0.9130737e-12	0.6172264e-26	-0.3490615e-0
		TIME	0.6128362	0.3064181	0.3064181	0.3064181	0.2298136	0.6128362
65	GLOBAL	MAXIMUM	-0.1331917e-02	-0.1011799e-18	0.2350189e-11	0.6667506e-20	0.1740522e-03	0.3929092e-0
		TIME	0.9192543	0.2298136	0.3064181	0.3064181	0.2298136	0.9192543
66	GLOBAL	MAXIMUM	0.1244708e-02	0.4996902e-19	0.2377342e-11	0.9344187e-12	-0.3465694e-28	-0.4891340e-0
		TIME	0.2298136	0.3064181	0.3064181	0.3064181	0.3064181	0.2298136
36	GLOBAL	MAXIMUM	0.1252925e-02	-0.2292829e-23	0.1157843e-06	0.4565159e-07	-0.6848247e-22	-0.4945160e-0
		TIME	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136
38	GLOBAL	MAXIMUM	0.2009859e-02	-0.2372887e-23	0.8889650e-27	0.2694018e-27	0.1491925e-26	-0.7809727e-0
		TIME	0.6128362	0.6128362	0.2298136	0.2298136	0.2298136	0.6128362
39	GLOBAL	MAXIMUM	0.1248899e-02	-0.5779950e-21	0.9650418e-22	0.3804979e-22	0.6839524e-22	-0.4929271e-0
		TIME	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136	0.2298136

```
 42        GLOBAL    MAXIMUM    0.1244775e-02  -0.1284199e-21  -0.3070937e-10  -0.1120618e-10  -0.2001960e-26  -0.4892611e-
                      TIME       0.2298136       0.2298136       0.3064181       0.3064181       0.3064181       0.2298136
 (  172) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  172) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  172) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  172) >  $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  172) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:26:45.5          Elapsed time: 0:27:7.0
 Memory: 132944 bytes,  Disk excps N/A
0---------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  10 pools of 524288 bytes total 5242880 bytes (3943%)
  32 growth step, 1/32 hole table factor
0---------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 2, R_Get 70, R_Put 1, R_Del 1
 B_Read 4, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 1 TRAFFIC INDUCED VIBRATIONS
AMPLITUDE 0.00124 FREQUENCY 10.4432

**** ACTIVE UNITS - LENGTH WEIGHT ANGLE TEMPERATURE TIME
**** ASSUMED TO BE INCH POUND RADIAN FAHRENHEIT SECOND

(2) > units m n
(3) > type space frame
(4) > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

(5) > repeat 1 id 43 x 14.4

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

(6) > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

(7) > repeat 1 id 43 x 14.4

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
{    8} > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
{    9} > joints coordinates
{   10} > 36 3.6 3.8 39.6 F
{   11} > 37 3.6 0.0 39.6 S
{   12} > 38 7.2 3.8 0.0 F
{   13} > 39 7.2 3.8 39.6 F
{   14} > 40 7.2 0.0 0.0 S
{   15} > 41 7.2 0.0 39.6 S
{   16} > 42 10.8 3.8 39.6 F
{   17} > 43 10.8 0.0 39.6 S
{   18} > member incidences
{   19} > 'b1' 1 2
{   20} > 'b2' 2 3
{   21} > 'b3' 3 4
{   22} > 'b4' 4 5
{   23} > 'b5' 5 6
{   24} > 'b6' 6 7
{   25} > 'b7' 7 8
{   26} > 'b8' 8 9
{   27} > 'b9' 9 10
{   28} > 'b10' 10 11
{   29} > 'b11' 11 12
{   30} > 'b12' 12 13
{   31} > 'b13' 13 14
{   32} > 'b14' 14 15
{   33} > 'b15' 15 16
{   34} > 'b16' 16 17
{   35} > 'b17' 17 18
{   36} > 'b18' 18 19
{   37} > 'b19' 19 20
{   38} > member incidences
{   39} > 'b20' 20 21
{   40} > 'b21' 21 22
{   41} > 'b22' 22 23
{   42} > 'ba23'  1 38
{   43} > 'ba24' 38 44
{   44} > 'bb25'  2 45
{   45} > 'bb26'  3 46
{   46} > 'bb27'  4 47
{   47} > 'bb28'  5 48
{   48} > 'bb29'  6 49
{   49} > 'bb30'  7 50
{   50} > 'bb31'  8 51
{   51} > 'bb32'  9 52
{   52} > 'bb33' 10 53
{   53} > 'bb34' 11 54
{   54} > 'bb35' 12 55
{   55} > 'bb36' 13 56
{   56} > 'bb37' 14 57
{   57} > 'bb38' 15 58
{   58} > 'bb39' 16 59
{   59} > 'bb40' 17 60
{   60} > 'bb41' 18 61
{   61} > member incidences
{   62} > 'bb42' 19 62
{   63} > 'bb43' 20 63
{   64} > 'bb44' 21 64
{   65} > 'bb45' 22 65
{   66} > 'bc46' 23 36
{   67} > 'bc47' 36 39
{   68} > 'bc48' 39 42
{   69} > 'bc49' 42 66
{   70} > 'bd50' 44 45
{   71} > 'bd51' 45 46
{   72} > 'bd52' 46 47
{   73} > 'bd53' 47 48
{   74} > 'bd54' 48 49
{   75} > 'bd55' 49 50
{   76} > 'bd56' 50 51
{   77} > 'bd57' 51 52
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(   78) > 'bd58' 52 53
(   79) > 'bd59' 53 54
(   80) > 'bd60' 54 55
(   81) > 'bd61' 55 56
(   82) > 'bd62' 56 57
(   83) > 'bd63' 57 58
(   84) > 'bd64' 58 59
(   85) > 'bd65' 59 60
(   86) > 'bd66' 60 61
(   87) > 'bd67' 61 62
(   88) > 'bd68' 62 63
(   89) > 'bd69' 63 64
(   90) > 'bd70' 64 65
(   91) > member incidences
(   92) > 'bd71' 65 66
(   93) > 's72'  24  1
(   94) > 's73'  25  3
(   95) > 's74'  26  5
(   96) > 's75'  27  7
(   97) > 's76'  28  9
(   98) > 's77'  29 11
(   99) > 's78'  30 13
(  100) > 's79'  31 15
(  101) > 's80'  32 17
(  102) > 's81'  33 19
(  103) > 's82'  34 21
(  104) > 's83'  35 23
(  105) > 's84'  37 36
(  106) > 's85'  40 38
(  107) > 's86'  41 39
(  108) > 's87'  43 42
(  109) > 's88'  67 44
(  110) > 's89'  68 46
(  111) > 's90'  69 48
(  112) > 's91'  70 50
(  113) > 's92'  71 52
(  114) > 's93'  72 54
(  115) > 's94'  73 56
(  116) > 's95'  74 58
(  117) > 's96'  75 60
(  118) > 's97'  76 62
(  119) > 's98'  77 64
(  120) > 's99'  78 66
(  121) >
(  121) > joint releases
(  122) > 25 to 34 kfx 1.15E7
(  123) > 68 to 77 kfx 1.15E7
(  124) > 40 37 41 43 kfz 1.15E7
(  125) > 1 for y for z mom x mom y mom z kfx  3.2574E6
(  126) > 3 for y for z mom x mom y mom z kfx 7.0822E5
(  127) > 5 for y for z mom x mom y mom z kfx 2.1247E6
(  128) > 11 for y for z mom x mom y mom z kfx 7.0822E5
(  129) > 17 for y for z mom x mom y mom z kfx 7.0822E5
(  130) > 19 for y for z mom x mom y mom z kfx 1.11225E6
(  131) > 44 for x for y mom x mom y mom z kfz 1.11225E6
(  132) > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
(  133) > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
(  134) >
(  134) > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
(  135) >
(  135) > member releases
(  136) > 'bb25' to 'bb45' start           moment x y z end moment y z
(  137) > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
(  138) > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
(  139) > 'ba23' 'ba24' start mom x y z end mom z y
(  140) > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
(  141) > member eccentricities
(  142) > 'bb25' to 'bb45' start x 0.15
(  143) > member properties prismatic
(  144) > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
(  145) > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
(  146) > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
(  147) > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
(  148) > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
(  149) > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  150) > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  151) > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
(  152) > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
(  153) > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
(  154) > material constants
(  155) > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
(  156) > material concrete 's85' 's80' 'bb25' to 'bb45'
(  157) > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
(  158) > material steel 'bd50' to 'bd71'
(  159) > constants beta 0.0 all
(  160) > dead load 'dl' direction -y all members
(  161) > damping percents 2.5 50
(  162) > inertia of joints lumped
```

```
( 163) > dynamic degrees of freedom with static condensation
( 164) > generate  70 from joints translations x

( 165) >   dynamic loading 1
( 166) >   support acceleration
( 167) >   transl x function  sin ampl 0.00124 freq 65.61686239 phase 0.0
( 168) >   integrate from 0.0 to  20.00 at 0.07660452

( 169) >    end of dynamic loading


BANDWIDTH INFORMATION BEFORE RENUMBERING.


THE MAXIMUM BANDWIDTH IS   72 AND OCCURS AT JOINT 38
THE AVERAGE BANDWIDTH IS                        19.308
THE STANDARD DEVIATION OF THE BANDWIDTH IS      16.383
                                              ----------
                                                35.690
                                              ==========



BANDWIDTH INFORMATION AFTER  RENUMBERING.


THE MAXIMUM BANDWIDTH IS    4 AND OCCURS AT JOINT 4
THE AVERAGE BANDWIDTH IS                         2.551
THE STANDARD DEVIATION OF THE BANDWIDTH IS       1.021
                                              ----------
                                                 3.572
                                              ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.44 SECONDS
TIME FOR BANDWIDTH REDUCTION                     1.41 SECONDS
TIME TO GENERATE   99 ELEMENT STIF. MATRICES     1.88 SECONDS
TIME TO PROCESS     71 MEMBER RELEASES           3.53 SECONDS
TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.15 SECONDS
TIME TO PROCESS   78 JOINTS                      3.88 SECONDS
TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.21 SECONDS
TIME TO ASSEMBLE LUMPED MASS MATRIX              0.60 SECONDS
TIME TO GENERATE REDUCED STIFFNESS MATRIX        9.80 SECONDS
TIME FOR CONDENSATION                          239.08 SECONDS
TIME TO TRANSFORM EIGENPROBLEM                   0.36 SECONDS
TIME FOR TRIDIAGONALIZATION                     11.36 SECONDS
TIME TO COMPUTE EIGENVALUES                      7.76 SECONDS
TIME TO COMPUTE EIGENVECTORS                     5.35 SECONDS
TIME TO TRANSFORM EIGENVECTORS                  10.55 SECONDS
TIME TO NORMALIZE EIGENVECTORS                   1.10 SECONDS
TIME TO TRANSFORM EIGENVECTORS TO JOINTS        95.80 SECONDS

************************
* EIGEN-SOLUTION CHECKS *
************************
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MODE	EIGENVALUE ((RAD/SEC)**2)	FREQUENCY (RAD/SEC)	FREQUENCY (CYC/SEC)	PERIOD (SEC/CYC)	ESTIMATED ACCURACY
1	6.727454d+01	8.202106d+00	1.305406d+00	7.660454d-01	1.682314d-10
2	6.954759d+01	8.339520d+00	1.327276d+00	7.534229d-01	1.715818d-10
3	7.757453d+01	8.807640d+00	1.401780d+00	7.133790d-01	5.332525d-11
4	8.785211d+01	9.372946d+00	1.491751d+00	6.703533d-01	1.053954d-10
5	9.546691d+01	9.770717d+00	1.555058d+00	6.430629d-01	9.126849d-11
6	1.111998d+02	1.054513d+01	1.678310d+00	5.958377d-01	4.898725d-11
7	1.195056d+02	1.093186d+01	1.739860d+00	5.747590d-01	4.387047d-11
8	1.396344d+02	1.181670d+01	1.880686d+00	5.317208d-01	4.177525d-11
9	1.677455d+02	1.295166d+01	2.061321d+00	4.851258d-01	1.219794d-12
10	2.066677d+02	1.437594d+01	2.288002d+00	4.370625d-01	3.011305d-11
11	4.878849d+02	2.208812d+01	3.515433d+00	2.844600d-01	2.553983d-11
12	8.257434d+02	2.873575d+01	4.573437d+00	2.186539d-01	1.439964d-12
13	1.399263d+03	3.740672d+01	5.953465d+00	1.679694d-01	1.660736d-12
14	1.500251d+03	3.873308d+01	6.164561d+00	1.622176d-01	7.436474d-12
15	1.649781d+03	4.061750d+01	6.464476d+00	1.546916d-01	7.459423d-12
16	1.838761d+03	4.288077d+01	6.824687d+00	1.465269d-01	1.807695d-12
17	2.046501d+03	4.523827d+01	7.199894d+00	1.388909d-01	4.440182d-13
18	2.254418d+03	4.748071d+01	7.556789d+00	1.323313d-01	2.205616d-12
19	2.446104d+03	4.945810d+01	7.871501d+00	1.270406d-01	3.810084d-12
20	2.586623d+03	5.085885d+01	8.094437d+00	1.235416d-01	2.089889d-12
21	2.674139d+03	5.171207d+01	8.230232d+00	1.215033d-01	2.045214d-12
22	3.563408d+03	5.969429d+01	9.500641d+00	1.052561d-01	3.623298d-13
23	4.780143d+03	6.913858d+01	1.100375d+01	9.087814d-02	1.458916d-12
24	2.609301d+04	1.615333d+02	2.570882d+01	3.889715d-02	2.697309d-13
25	2.806204d+04	1.675173d+02	2.666120d+01	3.750769d-02	2.082313d-13
26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13

28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 49.33 SECONDS
TIME TO COMPUTE TIME HISTORY RESPONSE 1043.36 SECONDS
(171) > list dynamic max dis max acc times all joints all
1

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - test1 TITLE - NONE GIVEN

ACTIVE UNITS M N RAD DEGF SEC

LOADING - 2

MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIC
1	GLOBAL	MAXIMUM	0.1726359e-05	-0.5139977e-23	-0.4306525e-12	-0.1692687e-12	0.	-0.6763578e-
		TIME	0.8426498	0.4596272	1.608695	1.608695	0.	0.8426498
3	GLOBAL	MAXIMUM	-0.1961055e-04	-0.3362848e-22	-0.4311187e-12	-0.1694520e-12	0.	0.7122513e-
		TIME	0.4596272	0.4596272	1.608695	1.608695	0.	0.4596272
5	GLOBAL	MAXIMUM	-0.1656349e-04	-0.2809408e-22	-0.4320516e-12	-0.1698187e-12	0.	0.6014871e-
		TIME	1.608695	1.608695	1.608695	1.608695	0.	1.608695
11	GLOBAL	MAXIMUM	-0.1284798e-04	-0.2524576e-22	-0.4376632e-12	-0.1720243e-12	0.	0.4691473e-
		TIME	0.4596272	0.4596272	1.608695	1.608695	0.	0.4596272
17	GLOBAL	MAXIMUM	-0.1432332e-04	-0.5545366e-20	-0.4475419e-12	-0.1757692e-12	0.	0.5161638e-
		TIME	0.4596272	1.608695	1.608695	1.608695	0.	0.4596272
19	GLOBAL	MAXIMUM	-0.1290097e-04	-0.9453903e-20	-0.4518872e-12	-0.1776151e-12	0.	0.4727336e-
		TIME	0.4596272	1.608695	1.608695	1.608695	0.	0.4596272
44	GLOBAL	MAXIMUM	0.1730822e-05	0.5138663e-23	-0.1920809e-13	-0.7549773e-14	0.	-0.6800863e-
		TIME	0.8426498	0.4596272	0.4596272	0.4596272	0.	0.8426498
24	GLOBAL	MAXIMUM	0.	0.	0.	-0.1451319e-14	0.	-0.5836539e-
		TIME	0.	0.	0.	1.608695	0.	0.8426498
25	GLOBAL	MAXIMUM	-0.1392462e-05	0.	0.	-0.1452890e-14	0.	0.6172009e-
		TIME	0.4596272	0.	0.	1.608695	0.	0.4596272
26	GLOBAL	MAXIMUM	-0.1174034e-05	0.	0.	-0.1456034e-14	0.	0.5215208e-
		TIME	1.608695	0.	0.	1.608695	0.	1.608695
27	GLOBAL	MAXIMUM	-0.1068560e-05	0.	0.	-0.1460754e-14	0.	0.4727853e-
		TIME	0.5362316	0.	0.	1.608695	0.	0.5362316
28	GLOBAL	MAXIMUM	0.1090647e-05	0.	0.	-0.1467056e-14	0.	-0.4822675e-
		TIME	0.9958588	0.	0.	1.608695	0.	0.9958588
29	GLOBAL	MAXIMUM	-0.8898418e-06	0.	0.	-0.1474946e-14	0.	0.4037343e-
		TIME	0.4596272	0.	0.	1.608695	0.	0.4596272
30	GLOBAL	MAXIMUM	0.9398973e-06	0.	0.	-0.1484432e-14	0.	-0.4190544e-
		TIME	0.9958588	0.	0.	1.608695	0.	0.9958588
31	GLOBAL	MAXIMUM	0.1089488e-05	0.	0.	-0.1495525e-14	0.	-0.4819350e-
		TIME	0.9958588	0.	0.	1.608695	0.	0.9958588
32	GLOBAL	MAXIMUM	-0.1164179e-05	0.	0.	-0.1784224e-14	0.	0.5252740e-
		TIME	0.4596272	0.	0.	1.608695	0.	0.4596272
33	GLOBAL	MAXIMUM	-0.8859531e-06	0.	0.	-0.1522881e-14	0.	0.4045024e-
		TIME	0.4596272	0.	0.	1.608695	0.	0.4596272
34	GLOBAL	MAXIMUM	-0.1315726e-05	0.	0.	-0.1539174e-14	0.	0.5839675e-
		TIME	1.225672	0.	0.	1.608695	0.	1.225672
35	GLOBAL	MAXIMUM	0.	0.	0.	-0.1557132e-14	0.	-0.1649920e-
		TIME	0.	0.	0.	1.608695	0.	1.608695

67	GLOBAL	MAXIMUM	0.	0.	0.	-0.6473216e-16	0.	-0.5834795e-08
		TIME	0.	0.	0.	0.4596272	0.	0.8426498
68	GLOBAL	MAXIMUM	-0.1374102e-05	0.	0.	-0.6503537e-16	0.	0.6151247e-07
		TIME	0.4596272	0.	0.	0.4596272	0.	0.4596272
69	GLOBAL	MAXIMUM	-0.1158791e-05	0.	0.	-0.6547374e-16	0.	0.5201733e-07
		TIME	1.608695	0.	0.	0.4596272	0.	1.608695
70	GLOBAL	MAXIMUM	-0.1057004e-05	0.	0.	-0.6604815e-16	0.	0.4713314e-07
		TIME	0.5362316	0.	0.	0.4596272	0.	0.5362316
71	GLOBAL	MAXIMUM	0.1079396e-05	0.	0.	-0.6675982e-16	0.	-0.4808489e-07
		TIME	0.9958588	0.	0.	0.4596272	0.	0.9958588
72	GLOBAL	MAXIMUM	-0.8858029e-06	0.	0.	-0.6761022e-16	0.	0.4033321e-07
		TIME	0.4596272	0.	0.	0.4596272	0.	0.4596272
73	GLOBAL	MAXIMUM	0.9350445e-06	0.	0.	-0.6860111e-16	0.	-0.4184019e-07
		TIME	0.9958588	0.	0.	0.4596272	0.	0.9958588
74	GLOBAL	MAXIMUM	0.1078395e-05	0.	0.	-0.6973456e-16	0.	-0.4805265e-07
		TIME	0.9958588	0.	0.	0.4596272	0.	0.9958588
75	GLOBAL	MAXIMUM	-0.9918693e-06	0.	0.	-0.7101291e-16	0.	0.4495205e-07
		TIME	0.4596272	0.	0.	0.4596272	0.	0.4596272
76	GLOBAL	MAXIMUM	-0.8887422e-06	0.	0.	-0.7243884e-16	0.	0.4049778e-07
		TIME	0.4596272	0.	0.	0.4596272	0.	0.4596272
77	GLOBAL	MAXIMUM	-0.1295372e-05	0.	0.	-0.7401529e-16	0.	0.5814454e-07
		TIME	1.225672	0.	0.	0.4596272	0.	1.225672
78	GLOBAL	MAXIMUM	0.	0.	0.	-0.7574555e-16	0.	-0.1635349e-07
		TIME	0.	0.	0.	0.4596272	0.	1.608695
37	GLOBAL	MAXIMUM	0.	0.	0.4152487e-12	0.1814637e-13	0.	-0.4653280e-09
		TIME	0.	0.	1.608695	1.608695	0.	1.608695
40	GLOBAL	MAXIMUM	0.	0.	0.6581104e-30	0.	0.	-0.2129719e-07
		TIME	0.	0.	1.608695	0.	0.	0.8426498
41	GLOBAL	MAXIMUM	0.	0.	0.3462816e-27	0.1513251e-28	0.	-0.4640171e-09
		TIME	0.	0.	1.608695	1.608695	0.	1.608695
43	GLOBAL	MAXIMUM	0.	0.	0.2078700e-13	0.9083916e-15	0.	-0.1635508e-07
		TIME	0.	0.	0.4596272	0.4596272	0.	1.608695

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	-0.1028536e-04	-0.1078194e-21	-0.4308856e-12	0.7913474e-23	-0.5436025e-05	0.3582443e-09
		TIME	0.4596272	0.4596272	1.608695	0.4596272	0.4596272	0.4596272
4	GLOBAL	MAXIMUM	-0.1667819e-04	-0.1658903e-21	-0.4315851e-12	-0.7892819e-23	0.5433376e-05	0.5530592e-09
		TIME	0.4596272	0.4596272	1.608695	0.9958588	0.9958588	0.4596272
6	GLOBAL	MAXIMUM	-0.1301017e-04	0.5014109e-21	-0.4327519e-12	-0.3232782e-21	-0.6061663e-05	0.4317319e-09
		TIME	1.225672	1.608695	1.608695	1.608695	1.378881	1.225672
7	GLOBAL	MAXIMUM	-0.1503933e-04	0.1135707e-20	-0.4334522e-12	-0.1703692e-12	0.	0.5468141e-07
		TIME	0.5362316	1.608695	1.608695	1.608695	0.	0.5362316
8	GLOBAL	MAXIMUM	-0.1451451e-04	-0.5984495e-21	-0.4343871e-12	0.3154979e-21	0.1619057e-05	0.5016166e-07
		TIME	0.5362316	0.6128362	1.608695	1.608695	1.838509	0.5362316
9	GLOBAL	MAXIMUM	0.1534439e-04	0.2771785e-22	-0.4353221e-12	-0.1711041e-12	0.	-0.5579995e-07
		TIME	0.9958588	0.9958588	1.608695	1.608695	0.	0.9958588
10	GLOBAL	MAXIMUM	0.1282779e-04	0.1347023e-21	-0.4364926e-12	0.4439111e-23	-0.3487677e-05	-0.4429184e-07
		TIME	0.2298136	0.2298136	1.608695	0.9192543	0.9192543	0.2298136
12	GLOBAL	MAXIMUM	0.1285182e-04	-0.1183485e-20	-0.4390706e-12	0.6373837e-21	0.3020238e-05	-0.4439514e-07
		TIME	0.2298136	1.608695	1.608695	1.608695	0.9192543	0.2298136
13	GLOBAL	MAXIMUM	0.1335074e-04	-0.2303082e-20	-0.4404781e-12	-0.1731307e-12	0.	-0.4868654e-07
		TIME	0.9958588	1.608695	1.608695	1.608695	0.	0.9958588
14	GLOBAL	MAXIMUM	0.1512800e-04	-0.4614373e-20	-0.4421239e-12	0.1291381e-20	0.1579750e-05	-0.5222736e-07
		TIME	0.9958588	1.608695	1.608695	1.608695	2.144927	0.9958588

15	GLOBAL	MAXIMUM	0.1533425e-04	-0.6952050e-20	-0.4437698e-12	-0.1744245e-12	0.	-0.5576817e-
		TIME	0.9958588	1.608695	1.608695	1.608695	0.	0.9958588
16	GLOBAL	MAXIMUM	0.1286835e-04	-0.6271323e-20	-0.4456559e-12	-0.3907454e-21	-0.4026774e-05	-0.4414689e-
		TIME	0.2298136	1.608695	1.608695	1.608695	0.9958588	0.2298136
18	GLOBAL	MAXIMUM	-0.1472498e-04	-0.7565833e-20	-0.4497146e-12	0.1085706e-20	-0.1016714e-05	0.4944487e-
		TIME	0.4596272	1.608695	1.608695	1.608695	1.838509	0.4596272
20	GLOBAL	MAXIMUM	-0.1527340e-04	-0.1188624e-19	-0.4543044e-12	0.1348792e-20	-0.3552577e-05	0.5157822e-
		TIME	0.4596272	1.608695	1.608695	1.608695	1.302277	0.4596272
21	GLOBAL	MAXIMUM	-0.1854079e-04	-0.1430955e-19	-0.4567217e-12	-0.1795153e-12	0.	0.6729466e-
		TIME	1.225672	1.608695	1.608695	1.608695	0.	1.225672
22	GLOBAL	MAXIMUM	-0.9598880e-05	-0.1193594e-19	-0.4593861e-12	-0.1293478e-20	0.5170114e-05	0.3400880e-
		TIME	1.225672	1.608695	1.608695	1.608695	0.5362316	1.225672
23	GLOBAL	MAXIMUM	0.4894328e-05	-0.9653031e-20	-0.4620506e-12	-0.1816098e-12	0.3810817e-28	-0.1923127e-
		TIME	1.608695	1.608695	1.608695	1.608695	1.608695	1.608695
45	GLOBAL	MAXIMUM	-0.1028745e-04	0.4264839e-21	-0.1925307e-13	-0.7913839e-23	-0.5438352e-05	0.3592256e-
		TIME	0.4596272	0.4596272	0.4596272	0.4596272	0.4596272	0.4596272
46	GLOBAL	MAXIMUM	-0.1961702e-04	0.3362848e-22	-0.1929806e-13	-0.7585138e-14	0.1861773e-28	0.7166532e-
		TIME	0.4596272	0.4596272	0.4596272	0.4596272	1.608695	0.4596272
47	GLOBAL	MAXIMUM	-0.1668511e-04	0.6580457e-21	-0.1936310e-13	0.7892827e-23	0.5438966e-05	0.5548005e-
		TIME	0.4596272	0.4596272	0.4596272	0.9958588	0.9958588	0.4596272
48	GLOBAL	MAXIMUM	-0.1658526e-04	0.2809408e-22	-0.1942814e-13	-0.7636264e-14	0.1865433e-28	0.6059943e-
		TIME	1.608695	1.608695	0.4596272	0.4596272	1.608695	1.608695
49	GLOBAL	MAXIMUM	-0.1301563e-04	0.5297816e-21	-0.1951336e-13	0.1736009e-22	-0.6066717e-05	0.4327671e-
		TIME	1.225672	1.225672	0.4596272	0.3064181	1.378881	1.225672
50	GLOBAL	MAXIMUM	-0.1503696e-04	0.7427596e-22	-0.1959858e-13	-0.7703259e-14	0.1871032e-28	0.5492493e-
		TIME	0.5362316	0.4596272	0.4596272	0.4596272	1.608695	0.5362316
51	GLOBAL	MAXIMUM	-0.1451790e-04	0.6153990e-21	-0.1970417e-13	-0.1496296e-22	0.1619298e-05	0.5028841e-
		TIME	0.5362316	0.5362316	0.4596272	0.6894407	1.838509	0.5362316
52	GLOBAL	MAXIMUM	0.1534193e-04	-0.2771785e-22	-0.1980976e-13	-0.7786262e-14	0.1878575e-28	-0.5603623e-
		TIME	0.9958588	0.9958588	0.4596272	0.4596272	1.608695	0.9958588
53	GLOBAL	MAXIMUM	0.1283105e-04	-0.5274539e-21	-0.1993593e-13	-0.4439111e-23	-0.3487934e-05	-0.4427273e-
		TIME	0.2298136	0.2298136	0.4596272	0.9192543	0.9192543	0.2298136
54	GLOBAL	MAXIMUM	-0.1285171e-04	0.2524576e-22	-0.2006210e-13	-0.7885444e-14	0.1888069e-28	0.4702334e-
		TIME	0.4596272	0.4596272	0.4596272	0.4596272	1.608695	0.4596272
55	GLOBAL	MAXIMUM	0.1285506e-04	-0.5232155e-21	-0.2020911e-13	-0.3252286e-22	0.3020498e-05	-0.4437986e-
		TIME	0.2298136	0.2298136	0.4596272	0.6894407	0.9192543	0.2298136
56	GLOBAL	MAXIMUM	0.1334794e-04	0.1069598e-21	-0.2035613e-13	-0.8001013e-14	0.1899523e-28	-0.4877951e-
		TIME	0.9958588	0.6894407	0.4596272	0.4596272	1.608695	0.9958588
57	GLOBAL	MAXIMUM	0.1513155e-04	-0.5510044e-21	-0.2052429e-13	0.6051462e-22	0.1579653e-05	-0.5238956e-
		TIME	0.9958588	0.2298136	0.4596272	0.4596272	2.144927	0.9958588
58	GLOBAL	MAXIMUM	0.1533148e-04	0.3188409e-21	-0.2069246e-13	-0.8133208e-14	0.1912950e-28	-0.5599960e-
		TIME	0.9958588	0.6894407	0.4596272	0.4596272	1.608695	0.9958588
59	GLOBAL	MAXIMUM	0.1287160e-04	-0.5009567e-21	-0.2088212e-13	0.3387510e-22	-0.4026148e-05	-0.4442901e-
		TIME	0.2298136	0.2298136	0.4596272	0.6894407	0.9958588	0.2298136
60	GLOBAL	MAXIMUM	-0.1432845e-04	0.1984168e-21	-0.2107179e-13	-0.8282304e-14	0.1928361e-28	0.5241125e-
		TIME	0.4596272	1.455486	0.4596272	0.4596272	1.608695	0.4596272
61	GLOBAL	MAXIMUM	-0.1473005e-04	-0.4541105e-21	-0.2128334e-13	0.6371087e-22	-0.1016926e-05	0.4982735e-
		TIME	0.4596272	0.1532090	0.4596272	0.4596272	1.838509	0.4596272
62	GLOBAL	MAXIMUM	-0.1290705e-04	-0.4211214e-21	-0.2149490e-13	-0.8448611e-14	0.1946172e-28	0.4724345e-
		TIME	0.4596272	0.4596272	0.4596272	0.4596272	1.608695	0.4596272
63	GLOBAL	MAXIMUM	-0.1527857e-04	-0.6006881e-21	-0.2172879e-13	-0.6794125e-22	-0.3551921e-05	0.5171417e-
		TIME	0.4596272	0.1532090	0.4596272	0.6894407	1.302277	0.4596272
64	GLOBAL	MAXIMUM	-0.1853822e-04	0.6632251e-21	-0.2196269e-13	-0.8632474e-14	0.1966000e-28	0.6773175e-
		TIME	1.225672	0.6894407	0.4596272	0.4596272	1.608695	1.225672
65	GLOBAL	MAXIMUM	-0.9600069e-05	-0.7501590e-21	-0.2221940e-13	-0.5776496e-22	0.5167203e-05	0.3409555e-
		TIME	1.225672	1.608695	0.4596272	1.608695	0.5362316	1.225672
66	GLOBAL	MAXIMUM	0.4852475e-05	-0.4662502e-21	-0.2247611e-13	-0.8834276e-14	0.	-0.1907226e-
		TIME	1.608695	0.4596272	0.4596272	0.4596272	0.	1.608695
36	GLOBAL	MAXIMUM	0.4881454e-05	-0.7832266e-26	0.3796823e-09	0.1497016e-09	-0.2245691e-24	-0.1926657e-

		TIME	1.608695	1.608695	1.608695	1.608695	1.608695	1.608695
38	GLOBAL	MAXIMUM	0.1726991e-05	-0.2111536e-26	0.2990214e-29	0.	0.4892350e-29	-0.6710583e-06
		TIME	0.8426498	0.1532090	1.608695	0.	1.608695	0.8426498
39	GLOBAL	MAXIMUM	0.4867702e-05	-0.2252635e-23	0.3166223e-24	0.1248382e-24	0.2242831e-24	-0.1921229e-05
		TIME	1.608695	1.608695	1.608695	1.608695	1.608695	1.608695
42	GLOBAL	MAXIMUM	0.4853072e-05	-0.5007254e-24	0.2903356e-12	0.1059466e-12	0.1892713e-28	-0.1907509e-05
		TIME	1.608695	1.608695	0.4596272	0.4596272	0.4596272	1.608695

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
1	GLOBAL	MAXIMUM	-0.5309818e-03	0.9198628e-21	-0.1086803e-09	-0.4271700e-10	0.	0.2067487e-03
		TIME	0.3830226	0.4596272	0.3830226	0.3830226	0.	0.3830226
3	GLOBAL	MAXIMUM	0.3384691e-02	0.6039844e-20	-0.1087980e-09	-0.4276325e-10	0.5258738e-28	-0.1219255e-02
		TIME	0.4596272	0.4596272	0.3830226	0.3830226	0.3830226	0.4596272
5	GLOBAL	MAXIMUM	0.4154180e-02	0.7132441e-20	-0.1090334e-09	-0.4285578e-10	0.5270571e-28	-0.1496870e-02
		TIME	1.608695	1.608695	0.3830226	0.3830226	0.3830226	1.608695
11	GLOBAL	MAXIMUM	0.2482021e-02	0.4713536e-20	-0.1104496e-09	-0.4341240e-10	0.5340985e-28	-0.8937876e-03
		TIME	0.4596272	0.4596272	0.3830226	0.3830226	0.3830226	0.4596272
17	GLOBAL	MAXIMUM	0.2630804e-02	-0.1394990e-17	-0.1129426e-09	-0.4435747e-10	0.4409147e-28	-0.9517809e-03
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	0.3830226	0.4596272
19	GLOBAL	MAXIMUM	0.2379373e-02	-0.2381786e-17	-0.1140392e-09	-0.4482331e-10	0.5518574e-28	-0.8598487e-03
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	0.3830226	0.4596272
44	GLOBAL	MAXIMUM	-0.5335472e-03	-0.9188845e-21	-0.1187146e-10	-0.4666100e-11	-0.5121566e-27	0.2095137e-03
		TIME	0.3830226	0.4596272	0.6128362	0.6128362	0.6128362	0.3830226
24	GLOBAL	MAXIMUM	0.	0.	0.	-0.3662579e-12	0.	0.1806051e-05
		TIME	0.	0.	0.	0.3830226	0.	0.3830226
25	GLOBAL	MAXIMUM	0.2698331e-03	0.	0.	-0.3666543e-12	0.	-0.1054012e-04
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
26	GLOBAL	MAXIMUM	0.3262387e-03	0.	0.	-0.3674478e-12	0.	-0.1296588e-04
		TIME	1.608695	0.	0.	0.3830226	0.	1.608695
27	GLOBAL	MAXIMUM	-0.1645939e-03	0.	0.	-0.3686389e-12	0.	0.6344126e-05
		TIME	0.3064181	0.	0.	0.3830226	0.	0.3064181
28	GLOBAL	MAXIMUM	0.1817778e-03	0.	0.	-0.3702292e-12	0.	-0.6817700e-05
		TIME	1.225672	0.	0.	0.3830226	0.	1.225672
29	GLOBAL	MAXIMUM	0.2025390e-03	0.	0.	-0.3722202e-12	0.	-0.7700384e-05
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
30	GLOBAL	MAXIMUM	0.1548161e-03	0.	0.	-0.3746142e-12	0.	0.5862961e-05
		TIME	2.757763	0.	0.	0.3830226	0.	1.838509
31	GLOBAL	MAXIMUM	0.1756549e-03	0.	0.	-0.3774138e-12	0.	-0.6572497e-05
		TIME	1.225672	0.	0.	0.3830226	0.	1.225672
32	GLOBAL	MAXIMUM	0.2037907e-03	0.	0.	-0.4502703e-12	0.	-0.9690016e-05
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
33	GLOBAL	MAXIMUM	0.1935579e-03	0.	0.	-0.3843174e-12	0.	-0.7360264e-05
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
34	GLOBAL	MAXIMUM	0.2243707e-03	0.	0.	-0.3884290e-12	0.	-0.8616437e-05
		TIME	1.225672	0.	0.	0.3830226	0.	1.225672
35	GLOBAL	MAXIMUM	0.	0.	0.	-0.3929610e-12	0.	-0.4171963e-05
		TIME	0.	0.	0.	0.3830226	0.	0.6128362
67	GLOBAL	MAXIMUM	0.	0.	0.	-0.4000739e-13	0.	0.1799763e-05
		TIME	0.	0.	0.	0.6128362	0.	0.3830226
68	GLOBAL	MAXIMUM	0.2670203e-03	0.	0.	-0.4019479e-13	0.	-0.1051614e-04
		TIME	0.4596272	0.	0.	0.6128362	0.	0.4596272
69	GLOBAL	MAXIMUM	0.3228228e-03	0.	0.	-0.4046572e-13	0.	-0.1293794e-04
		TIME	1.608695	0.	0.	0.6128362	0.	1.608695
70	GLOBAL	MAXIMUM	-0.1637657e-03	0.	0.	-0.4082074e-13	0.	0.6333419e-05

		TIME	0.3064181	0.	0.	0.6128362	0.	0.3064181
71	GLOBAL	MAXIMUM	0.1806006e-03	0.	0.	-0.4126058e-13	0.	-0.6802774e-
		TIME	1.225672	0.	0.	0.6128362	0.	1.225672
72	GLOBAL	MAXIMUM	0.2015175e-03	0.	0.	-0.4178616e-13	0.	-0.7689667e-
		TIME	0.4596272	0.	0.	0.6128362	0.	0.4596272
73	GLOBAL	MAXIMUM	0.1545825e-03	0.	0.	-0.4239858e-13	0.	0.5858796e-
		TIME	2.757763	0.	0.	0.6128362	0.	1.838509
74	GLOBAL	MAXIMUM	0.1749757e-03	0.	0.	-0.4309910e-13	0.	-0.6563798e-
		TIME	1.225672	0.	0.	0.6128362	0.	1.225672
75	GLOBAL	MAXIMUM	0.2122284e-03	0.	0.	-0.4388918e-13	0.	-0.8155585e-
		TIME	0.4596272	0.	0.	0.6128362	0.	0.4596272
76	GLOBAL	MAXIMUM	0.1939198e-03	0.	0.	-0.4477047e-13	0.	-0.7368232e-
		TIME	0.4596272	0.	0.	0.6128362	0.	0.4596272
77	GLOBAL	MAXIMUM	0.2213995e-03	0.	0.	-0.4574479e-13	0.	-0.8585512e-
		TIME	1.225672	0.	0.	0.6128362	0.	1.225672
78	GLOBAL	MAXIMUM	0.	0.	0.	-0.4681416e-13	0.	-0.4131774e-
		TIME	0.	0.	0.	0.6128362	0.	0.6128362
37	GLOBAL	MAXIMUM	0.	0.	0.1047930e-09	0.4579454e-11	0.	-0.1172863e-
		TIME	0.	0.	0.3830226	0.3830226	0.	0.6128362
40	GLOBAL	MAXIMUM	0.	0.	0.1564402e-27	0.6836438e-29	0.	0.6565633e-
		TIME	0.	0.	0.3830226	0.3830226	0.	0.3830226
41	GLOBAL	MAXIMUM	0.	0.	0.8728381e-25	0.3814302e-26	0.	-0.1170956e-
		TIME	0.	0.	0.3830226	0.3830226	0.	0.6128362
43	GLOBAL	MAXIMUM	0.	0.	0.1284730e-10	0.5614270e-12	0.	-0.4131032e-
		TIME	0.	0.	0.6128362	0.6128362	0.	0.6128362

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIC
2	GLOBAL	MAXIMUM	0.1834529e-02	0.2035610e-19	-0.1087392e-09	-0.1422217e-20	-0.9786529e-03	-0.6838624e-
		TIME	0.4596272	0.4596272	0.3830226	0.4596272	0.6894407	0.4596272
4	GLOBAL	MAXIMUM	0.3600507e-02	0.3495871e-19	-0.1089157e-09	0.1343106e-20	-0.9756770e-03	-0.1172584e-
		TIME	1.608695	1.608695	0.3830226	0.9958588	0.9958588	1.608695
6	GLOBAL	MAXIMUM	0.2815982e-02	-0.1592116e-18	-0.1092101e-09	-0.7864784e-19	-0.1099473e-02	-0.9244556e-
		TIME	1.225672	0.2298136	0.3830226	0.3830226	1.608695	1.225672
7	GLOBAL	MAXIMUM	-0.2042975e-02	0.2856996e-18	-0.1093869e-09	-0.4299471e-10	0.5288209e-28	0.7366669e-
		TIME	0.3064181	0.3830226	0.3830226	0.3830226	0.3830226	0.3064181
8	GLOBAL	MAXIMUM	-0.2048743e-02	-0.1579513e-18	-0.1096228e-09	0.7938345e-19	-0.2925417e-03	0.7018544e-
		TIME	0.3064181	0.2298136	0.3830226	0.3830226	0.9958588	0.3064181
9	GLOBAL	MAXIMUM	0.2198887e-02	0.4083140e-20	-0.1098588e-09	-0.4318019e-10	0.5311671e-28	-0.7904822e-
		TIME	1.225672	1.225672	0.3830226	0.3830226	0.3830226	1.225672
10	GLOBAL	MAXIMUM	0.2219471e-02	0.2250609e-19	-0.1101542e-09	0.5207205e-21	-0.4117848e-03	-0.7437519e-
		TIME	0.4596272	0.4596272	0.3830226	0.6894407	0.6894407	0.4596272
12	GLOBAL	MAXIMUM	0.2230434e-02	-0.2873360e-18	-0.1108047e-09	0.1616234e-18	0.3716236e-03	-0.7522610e-
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	0.6894407	0.4596272
13	GLOBAL	MAXIMUM	-0.1890861e-02	-0.5808153e-18	-0.1111599e-09	-0.4369162e-10	0.5376183e-28	0.6828116e-
		TIME	1.838509	0.3830226	0.3830226	0.3830226	0.3830226	1.838509
14	GLOBAL	MAXIMUM	0.2052841e-02	-0.1169257e-17	-0.1115753e-09	0.3262660e-18	0.1677113e-03	-0.7115446e-
		TIME	1.225672	0.3830226	0.3830226	0.3830226	1.838509	1.225672
15	GLOBAL	MAXIMUM	0.2122749e-02	-0.1755372e-17	-0.1119906e-09	-0.4401813e-10	0.5417305e-28	-0.7640508e-
		TIME	1.225672	0.3830226	0.3830226	0.3830226	0.3830226	1.225672
16	GLOBAL	MAXIMUM	0.2282208e-02	-0.1572820e-17	-0.1124666e-09	-0.1001060e-18	0.4376282e-03	-0.7725057e-
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	1.608695	0.4596272
18	GLOBAL	MAXIMUM	0.2705646e-02	-0.1881690e-17	-0.1134909e-09	0.2741101e-18	0.1334936e-03	-0.9058148e-
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	1.838509	0.4596272
20	GLOBAL	MAXIMUM	0.2769520e-02	-0.2994450e-17	-0.1146492e-09	0.3419830e-18	0.3736130e-03	-0.9094173e-

		TIME	0.4596272	0.3830226	0.3830226	0.3830226	1.302277	0.4596272
21	GLOBAL	MAXIMUM	0.2768391e-02	-0.3612924e-17	-0.1152592e-09	-0.4530284e-10	0.5578834e-28	-0.9948774e-0
		TIME	1.225672	0.3830226	0.3830226	0.3830226	0.3830226	1.225672
22	GLOBAL	MAXIMUM	0.1545067e-02	-0.3021717e-17	-0.1159316e-09	-0.3267621e-18	-0.1075810e-02	-0.5052905e-0
		TIME	1.225672	0.3830226	0.3830226	0.3830226	0.4596272	1.225672
23	GLOBAL	MAXIMUM	0.1231814e-02	-0.2436580e-17	-0.1166040e-09	-0.4583142e-10	0.9617055e-26	-0.4817329e-0
		TIME	0.6128362	0.3830226	0.3830226	0.3830226	0.3830226	0.6128362
45	GLOBAL	MAXIMUM	0.1834336e-02	-0.8116705e-19	-0.1189927e-10	0.1422489e-20	-0.9790368e-03	-0.6855145e-0
		TIME	0.4596272	0.4596272	0.6128362	0.4596272	0.6894407	0.4596272
46	GLOBAL	MAXIMUM	0.3386199e-02	-0.6039844e-20	-0.1192707e-10	-0.4687957e-11	0.4995801e-26	-0.1225487e-0
		TIME	0.4596272	0.4596272	0.6128362	0.6128362	0.3830226	0.4596272
47	GLOBAL	MAXIMUM	0.3602108e-02	-0.1394897e-18	-0.1196727e-10	-0.1343111e-20	-0.9769610e-03	-0.1178387e-0
		TIME	1.608695	1.608695	0.6128362	0.9958588	0.9958588	1.608695
48	GLOBAL	MAXIMUM	0.4159939e-02	-0.7132441e-20	-0.1200746e-10	-0.4719556e-11	0.5007042e-26	-0.1507400e-0
		TIME	1.608695	1.608695	0.6128362	0.6128362	0.3830226	1.608695
49	GLOBAL	MAXIMUM	0.2817142e-02	-0.1208698e-18	-0.1206014e-10	0.7704466e-20	-0.1101194e-02	-0.9266548e-0
		TIME	1.225672	1.225672	0.6128362	0.8426498	1.608695	1.225672
50	GLOBAL	MAXIMUM	-0.2042672e-02	-0.3298064e-19	-0.1211281e-10	-0.4760962e-11	0.5023798e-26	0.7383408e-0
		TIME	0.3064181	0.8426498	0.6128362	0.6128362	0.3830226	0.3064181
51	GLOBAL	MAXIMUM	-0.2049217e-02	0.9114357e-19	-0.1217807e-10	0.8766479e-20	-0.2926270e-03	0.7026072e-0
		TIME	0.3064181	0.3064181	0.6128362	0.6128362	0.9958588	0.3064181
52	GLOBAL	MAXIMUM	0.2198593e-02	-0.4083140e-20	-0.1224332e-10	-0.4812261e-11	0.5046087e-26	-0.7929353e-0
		TIME	1.225672	1.225672	0.6128362	0.6128362	0.3830226	1.225672
53	GLOBAL	MAXIMUM	0.2220174e-02	-0.8853023e-19	-0.1232130e-10	-0.5207205e-21	-0.4120660e-03	-0.7442626e-0
		TIME	0.4596272	0.4596272	0.6128362	0.6894407	0.6894407	0.4596272
54	GLOBAL	MAXIMUM	0.2482729e-02	-0.4713536e-20	-0.1239928e-10	-0.4873560e-11	0.5073936e-26	-0.8964133e-0
		TIME	0.4596272	0.4596272	0.6128362	0.6128362	0.3830226	0.4596272
55	GLOBAL	MAXIMUM	0.2231078e-02	0.6417193e-19	-0.1249014e-10	0.1869609e-19	0.3718928e-03	-0.7529477e-0
		TIME	0.4596272	1.838509	0.6128362	0.6128362	0.6894407	0.4596272
56	GLOBAL	MAXIMUM	-0.1890481e-02	-0.6526827e-19	-0.1258100e-10	-0.4944987e-11	0.5107374e-26	0.6832156e-0
		TIME	1.838509	0.6128362	0.6128362	0.6128362	0.3830226	1.838509
57	GLOBAL	MAXIMUM	0.2053182e-02	-0.1299040e-18	-0.1268494e-10	0.3743700e-19	0.1677042e-03	-0.7122016e-0
		TIME	1.225672	0.6128362	0.6128362	0.6128362	1.838509	1.225672
58	GLOBAL	MAXIMUM	0.2122333e-02	-0.2000414e-18	-0.1278887e-10	-0.5026689e-11	0.5146440e-26	-0.7652813e-0
		TIME	1.225672	0.6128362	0.6128362	0.6128362	0.3830226	1.225672
59	GLOBAL	MAXIMUM	0.2282864e-02	-0.1425205e-18	-0.1290609e-10	-0.1834572e-19	0.4379681e-03	-0.7712075e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	1.608695	0.4596272
60	GLOBAL	MAXIMUM	0.2631825e-02	-0.1339969e-18	-0.1302331e-10	-0.5118837e-11	0.5191178e-26	-0.9508584e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	0.3830226	0.4596272
61	GLOBAL	MAXIMUM	0.2706563e-02	-0.1572544e-18	-0.1315407e-10	0.3927207e-19	0.1335033e-03	-0.9051845e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	1.838509	0.4596272
62	GLOBAL	MAXIMUM	0.2380494e-02	-0.2753762e-18	-0.1328482e-10	-0.5221622e-11	0.5242645e-26	-0.8595106e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	0.3830226	0.4596272
63	GLOBAL	MAXIMUM	0.2770631e-02	-0.3159916e-18	-0.1342937e-10	0.4150494e-19	0.3734789e-03	-0.9123950e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	1.302277	0.4596272
64	GLOBAL	MAXIMUM	0.2767696e-02	-0.4247939e-18	-0.1357393e-10	-0.5335258e-11	0.5299893e-26	-0.1000312e-0
		TIME	1.225672	0.6128362	0.6128362	0.6128362	0.3830226	1.225672
65	GLOBAL	MAXIMUM	0.1545722e-02	-0.3749653e-18	-0.1373259e-10	-0.3732789e-19	-0.1074025e-02	-0.5053628e-0
		TIME	1.225672	0.6128362	0.6128362	0.6128362	0.4596272	1.225672
66	GLOBAL	MAXIMUM	0.1225410e-02	-0.2904134e-18	-0.1389125e-10	-0.5459981e-11	0.2025069e-27	-0.4814044e-0
		TIME	0.6128362	0.6128362	0.6128362	0.6128362	0.6128362	0.6128362
36	GLOBAL	MAXIMUM	0.1230375e-02	-0.1810454e-23	0.9581739e-07	0.3777900e-07	-0.5667271e-22	-0.4856157e-0
		TIME	0.6128362	0.3830226	0.3830226	0.3830226	0.3830226	0.6128362
38	GLOBAL	MAXIMUM	-0.5324077e-03	0.5904789e-24	0.7108075e-27	0.2154110e-27	0.1234643e-26	0.2068781e-0
		TIME	0.3830226	0.3830226	0.3830226	0.3830226	0.3830226	0.3830226
39	GLOBAL	MAXIMUM	0.1228374e-02	-0.5683362e-21	0.7980788e-22	0.3146675e-22	0.5660053e-22	-0.4848260e-0
		TIME	0.6128362	0.6128362	0.3830226	0.3830226	0.3830226	0.6128362
42	GLOBAL	MAXIMUM	0.1225808e-02	-0.1264006e-21	0.1794405e-09	0.6547977e-10	0.1169782e-25	-0.4818062e-0
		TIME	0.6128362	0.6128362	0.6128362	0.6128362	0.6128362	0.6128362

```
 (  172) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  172) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  172) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  172) >  $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  172) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:27:27.3         Elapsed time: 0:41:24.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  10 pools of 524288 bytes total 5242880 bytes (3943%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 2, R_Get 70, R_Put 1, R_Del 1
 B_Read 4, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 1 TRAFFIC INDUCED VIBRATIONS
AMPLITUDE 0.002 FREQUENCY 13.05406

**** ACTIVE UNITS - LENGTH WEIGHT ANGLE TEMPERATURE TIME
**** ASSUMED TO BE INCH POUND RADIAN FAHRENHEIT SECOND

(2) > units m n
(3) > type space frame
(4) > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

(5) > repeat 1 id 43 x 14.4

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

(6) > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

(7) > repeat 1 id 43 x 14.4

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
{    8} > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
{    9} > joints coordinates
{   10} > 36 3.6 3.8 39.6 F
{   11} > 37 3.6 0.0 39.6 S
{   12} > 38 7.2 3.8 0.0 F
{   13} > 39 7.2 3.8 39.6 F
{   14} > 40 7.2 0.0 0.0 S
{   15} > 41 7.2 0.0 39.6 S
{   16} > 42 10.8 3.8 39.6 F
{   17} > 43 10.8 0.0 39.6 S
{   18} > member incidences
{   19} > 'b1' 1 2
{   20} > 'b2' 2 3
{   21} > 'b3' 3 4
{   22} > 'b4' 4 5
{   23} > 'b5' 5 6
{   24} > 'b6' 6 7
{   25} > 'b7' 7 8
{   26} > 'b8' 8 9
{   27} > 'b9' 9 10
{   28} > 'b10' 10 11
{   29} > 'b11' 11 12
{   30} > 'b12' 12 13
{   31} > 'b13' 13 14
{   32} > 'b14' 14 15
{   33} > 'b15' 15 16
{   34} > 'b16' 16 17
{   35} > 'b17' 17 18
{   36} > 'b18' 18 19
{   37} > 'b19' 19 20
{   38} > member incidences
{   39} > 'b20' 20 21
{   40} > 'b21' 21 22
{   41} > 'b22' 22 23
{   42} > 'ba23'  1 38
{   43} > 'ba24' 38 44
{   44} > 'bb25'  2 45
{   45} > 'bb26'  3 46
{   46} > 'bb27'  4 47
{   47} > 'bb28'  5 48
{   48} > 'bb29'  6 49
{   49} > 'bb30'  7 50
{   50} > 'bb31'  8 51
{   51} > 'bb32'  9 52
{   52} > 'bb33' 10 53
{   53} > 'bb34' 11 54
{   54} > 'bb35' 12 55
{   55} > 'bb36' 13 56
{   56} > 'bb37' 14 57
{   57} > 'bb38' 15 58
{   58} > 'bb39' 16 59
{   59} > 'bb40' 17 60
{   60} > 'bb41' 18 61
{   61} > member incidences
{   62} > 'bb42' 19 62
{   63} > 'bb43' 20 63
{   64} > 'bb44' 21 64
{   65} > 'bb45' 22 65
{   66} > 'bc46' 23 36
{   67} > 'bc47' 36 39
{   68} > 'bc48' 39 42
{   69} > 'bc49' 42 66
{   70} > 'bd50' 44 45
{   71} > 'bd51' 45 46
{   72} > 'bd52' 46 47
{   73} > 'bd53' 47 48
{   74} > 'bd54' 48 49
{   75} > 'bd55' 49 50
{   76} > 'bd56' 50 51
{   77} > 'bd57' 51 52
```

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{   78} > 'bd58' 52 53
{   79} > 'bd59' 53 54
{   80} > 'bd60' 54 55
{   81} > 'bd61' 55 56
{   82} > 'bd62' 56 57
{   83} > 'bd63' 57 58
{   84} > 'bd64' 58 59
{   85} > 'bd65' 59 60
{   86} > 'bd66' 60 61
{   87} > 'bd67' 61 62
{   88} > 'bd68' 62 63
{   89} > 'bd69' 63 64
{   90} > 'bd70' 64 65
{   91} > member incidences
{   92} > 'bd71' 65 66
{   93} > 's72'  24  1
{   94} > 's73'  25  3
{   95} > 's74'  26  5
{   96} > 's75'  27  7
{   97} > 's76'  28  9
{   98} > 's77'  29 11
{   99} > 's78'  30 13
{  100} > 's79'  31 15
{  101} > 's80'  32 17
{  102} > 's81'  33 19
{  103} > 's82'  34 21
{  104} > 's83'  35 23
{  105} > 's84'  37 36
{  106} > 's85'  40 38
{  107} > 's86'  41 39
{  108} > 's87'  43 42
{  109} > 's88'  67 44
{  110} > 's89'  68 46
{  111} > 's90'  69 48
{  112} > 's91'  70 50
{  113} > 's92'  71 52
{  114} > 's93'  72 54
{  115} > 's94'  73 56
{  116} > 's95'  74 58
{  117} > 's96'  75 60
{  118} > 's97'  76 62
{  119} > 's98'  77 64
{  120} > 's99'  78 66
{  121} >
{  121} > joint releases
{  122} > 25 to 34 kfx 1.15E7
{  123} > 68 to 77 kfx 1.15E7
{  124} > 40 37 41 43 kfz 1.15E7
{  125} > 1 for y for z mom x mom y mom z kfx  3.2574E6
{  126} > 3 for y for z mom x mom y mom z kfx 7.0822E5
{  127} > 5 for y for z mom x mom y mom z kfx 2.1247E6
{  128} > 11 for y for z mom x mom y mom z kfx 7.0822E5
{  129} > 17 for y for z mom x mom y mom z kfx 7.0822E5
{  130} > 19 for y for z mom x mom y mom z kfx 1.11225E6
{  131} > 44 for x for y mom x mom y mom z kfz 1.11225E6
{  132} > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
{  133} > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
{  134} >
{  134} > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
{  135} >
{  135} > member releases
{  136} > 'bb25' to 'bb45' start           moment x y z end moment y z
{  137} > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
{  138} > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
{  139} > 'ba23' 'ba24' start mom x y z end mom z y
{  140} > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
{  141} > member eccentricities
{  142} > 'bb25' to 'bb45' start x 0.15
{  143} > member properties prismatic
{  144} > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
{  145} > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
{  146} > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
{  147} > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
{  148} > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
{  149} > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
{  150} > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
{  151} > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
{  152} > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
{  153} > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
{  154} > material constants
{  155} > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
{  156} > material concrete 's85' 's80' 'bb25' to 'bb45'
{  157} > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
{  158} > material steel 'bd50' to 'bd71'
{  159} > constants beta 0.0 all
{  160} > dead load 'dl' direction -y all members
{  161} > damping percents 2.5 50
{  162} > inertia of joints lumped
```

```
( 163) > dynamic degrees of freedom with static condensation
( 164) > generate  70 from joints translations x
( 165) >
( 165) >   dynamic loading 1
( 166) >   support acceleration
( 167) >   transl x function  sin ampl 0.00200 freq 82.021078 phase 0.0
( 168) >   integrate from 0.0 to  20.00 at 0.07660452

( 169) >    end of dynamic loading
( 170) >    dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS   72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                      19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS    16.383
                                              ----------
                                               35.690
                                              ==========



 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                       2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS     1.021
                                              ----------
                                                3.572
                                              ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.42 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.41 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES    1.90 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.40 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.25 SECONDS
 TIME TO PROCESS   78 JOINTS                      3.90 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.21 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.60 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        9.80 SECONDS
 TIME FOR CONDENSATION                          232.56 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.36 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.13 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.60 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.15 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.26 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.08 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        94.18 SECONDS

 *************************
 * EIGEN-SOLUTION CHECKS *
 *************************


 MODE------EIGENVALUE-------FREQUENCY-------FREQUENCY--------PERIOD--------ESTIMATED---/
         ((RAD/SEC)**2)      (RAD/SEC)        (CYC/SEC)        (SEC/CYC)       ACCURACY

    1     6.727454d+01    8.202106d+00    1.305406d+00    7.660454d-01    1.682314d-10
    2     6.954759d+01    8.339520d+00    1.327276d+00    7.534229d-01    1.715818d-10
    3     7.757453d+01    8.807640d+00    1.401780d+00    7.133790d-01    5.332525d-11
    4     8.785211d+01    9.372946d+00    1.491751d+00    6.703533d-01    1.053954d-10
    5     9.546691d+01    9.770717d+00    1.555058d+00    6.430629d-01    9.126849d-11
    6     1.111998d+02    1.054513d+01    1.678310d+00    5.958377d-01    4.898725d-11
    7     1.195056d+02    1.093186d+01    1.739860d+00    5.747590d-01    4.387047d-11
    8     1.396344d+02    1.181670d+01    1.880686d+00    5.317208d-01    4.177525d-11
    9     1.677455d+02    1.295166d+01    2.061321d+00    4.851258d-01    1.219794d-12
   10     2.066677d+02    1.437594d+01    2.288002d+00    4.370625d-01    3.011305d-11
   11     4.878849d+02    2.208812d+01    3.515433d+00    2.844600d-01    2.553983d-11
   12     8.257434d+02    2.873575d+01    4.573437d+00    2.186539d-01    1.439964d-12
   13     1.399263d+03    3.740672d+01    5.953465d+00    1.679694d-01    1.660736d-12
   14     1.500251d+03    3.873308d+01    6.164561d+00    1.622176d-01    7.436474d-12
   15     1.649781d+03    4.061750d+01    6.464476d+00    1.546916d-01    7.459423d-12
   16     1.838761d+03    4.288077d+01    6.824687d+00    1.465269d-01    1.807695d-12
   17     2.046501d+03    4.523827d+01    7.199894d+00    1.388909d-01    4.440182d-13
   18     2.254418d+03    4.748071d+01    7.556789d+00    1.323313d-01    2.205616d-12
   19     2.446104d+03    4.945810d+01    7.871501d+00    1.270406d-01    3.810084d-12
   20     2.586623d+03    5.085885d+01    8.094437d+00    1.235416d-01    2.089889d-12
   21     2.674139d+03    5.171207d+01    8.230232d+00    1.215033d-01    2.045214d-12
   22     3.563408d+03    5.969429d+01    9.500641d+00    1.052561d-01    3.623298d-13
   23     4.780143d+03    6.913858d+01    1.100375d+01    9.087814d-02    1.458916d-12
   24     2.609301d+04    1.615333d+02    2.570882d+01    3.889715d-02    2.697309d-13
   25     2.806204d+04    1.675173d+02    2.666120d+01    3.750769d-02    2.082313d-13
```

26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 48.85 SECONDS
TIME TO COMPUTE TIME HISTORY RESPONSE 1019.30 SECONDS

(171) > list dynamic max dis max acc times all joints all
1

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - test1 TITLE - NONE GIVEN

ACTIVE UNITS M N RAD DEGF SEC

LOADING - 2

MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIO
1	GLOBAL	MAXIMUM	-0.1114059e-08	-0.2082298e-26	0.1644263e-15	0.6462804e-16	0.	0.4461798e-
		TIME	17.31262	17.23602	18.07867	18.07867	0.	17.31262
3	GLOBAL	MAXIMUM	-0.7941413e-08	-0.1302230e-25	0.1646043e-15	0.6469800e-16	0.	0.2872098e-
		TIME	17.23602	17.23602	18.07867	18.07867	0.	17.23602
5	GLOBAL	MAXIMUM	-0.3782806e-08	-0.8240677e-26	0.1649604e-15	0.6483800e-16	0.	0.1372393e-
		TIME	18.00206	16.69979	18.07867	18.07867	0.	18.00206
11	GLOBAL	MAXIMUM	-0.5806883e-08	-0.1241728e-25	0.1671030e-15	0.6568013e-16	0.	0.2117538e-
		TIME	17.23602	17.23602	18.07867	18.07867	0.	17.23602
17	GLOBAL	MAXIMUM	-0.6446288e-08	0.2107814e-23	0.1708748e-15	0.6710996e-16	0.	0.2314619e-
		TIME	17.23602	18.07867	18.07867	18.07867	0.	17.23602
19	GLOBAL	MAXIMUM	-0.5673285e-08	0.3599766e-23	0.1725338e-15	0.6781474e-16	0.	0.2068021e-
		TIME	17.23602	18.07867	18.07867	18.07867	0.	17.23602
44	GLOBAL	MAXIMUM	-0.1116301e-08	0.2081628e-26	0.5615015e-17	0.2206992e-17	0.	0.4396077e-
		TIME	17.31262	17.23602	19.76397	19.76397	0.	17.31262
24	GLOBAL	MAXIMUM	0.	0.	0.	0.5541242e-18	0.	0.3683899e-
		TIME	0.	0.	0.	18.07867	0.	17.31262
25	GLOBAL	MAXIMUM	-0.5879279e-09	0.	0.	0.5547241e-18	0.	0.2493634e-
		TIME	17.23602	0.	0.	18.07867	0.	17.23602
26	GLOBAL	MAXIMUM	-0.2845620e-09	0.	0.	0.5559245e-18	0.	0.1181134e-
		TIME	18.00206	0.	0.	18.07867	0.	18.00206
27	GLOBAL	MAXIMUM	-0.5410731e-09	0.	0.	0.5577267e-18	0.	0.2304030e-
		TIME	17.31262	0.	0.	18.07867	0.	17.31262
28	GLOBAL	MAXIMUM	-0.4856797e-09	0.	0.	0.5601326e-18	0.	0.2077745e-
		TIME	17.31262	0.	0.	18.07867	0.	17.31262
29	GLOBAL	MAXIMUM	-0.4232330e-09	0.	0.	0.5631450e-18	0.	0.1813053e-
		TIME	17.23602	0.	0.	18.07867	0.	17.23602
30	GLOBAL	MAXIMUM	-0.5061703e-09	0.	0.	0.5667669e-18	0.	0.2163894e-
		TIME	17.31262	0.	0.	18.07867	0.	17.31262
31	GLOBAL	MAXIMUM	-0.5367888e-09	0.	0.	0.5710024e-18	0.	0.2304005e-
		TIME	18.07867	0.	0.	18.07867	0.	18.07867
32	GLOBAL	MAXIMUM	-0.5491262e-09	0.	0.	0.6812295e-18	0.	0.2352492e-
		TIME	17.23602	0.	0.	18.07867	0.	17.23602
33	GLOBAL	MAXIMUM	-0.4141465e-09	0.	0.	0.5814471e-18	0.	0.1771584e-
		TIME	17.23602	0.	0.	18.07867	0.	17.23602
34	GLOBAL	MAXIMUM	-0.5369075e-09	0.	0.	0.5876677e-18	0.	0.2269642e-
		TIME	17.38923	0.	0.	18.07867	0.	17.38923
35	GLOBAL	MAXIMUM	0.	0.	0.	0.5945244e-18	0.	0.5125094e-

		TIME	0.	0.	0.	18.07867	0.	19.76397
67	GLOBAL	MAXIMUM	0.	0.	0.	0.1892287e-19	0.	0.3754814e-11
		TIME	0.	0.	0.	19.76397	0.	17.31262
68	GLOBAL	MAXIMUM	-0.5791583e-09	0.	0.	0.1901151e-19	0.	0.2483690e-10
		TIME	17.23602	0.	0.	19.76397	0.	17.23602
69	GLOBAL	MAXIMUM	-0.2836213e-09	0.	0.	0.1913965e-19	0.	0.1181176e-10
		TIME	18.00206	0.	0.	19.76397	0.	18.00206
70	GLOBAL	MAXIMUM	-0.5363308e-09	0.	0.	0.1930757e-19	0.	0.2297986e-10
		TIME	17.31262	0.	0.	19.76397	0.	17.31262
71	GLOBAL	MAXIMUM	-0.4848590e-09	0.	0.	0.1951561e-19	0.	0.2076385e-10
		TIME	17.31262	0.	0.	19.76397	0.	17.31262
72	GLOBAL	MAXIMUM	-0.4240678e-09	0.	0.	0.1976420e-19	0.	0.1814445e-10
		TIME	17.23602	0.	0.	19.76397	0.	17.23602
73	GLOBAL	MAXIMUM	-0.5045532e-09	0.	0.	0.2005386e-19	0.	0.2161585e-10
		TIME	17.31262	0.	0.	19.76397	0.	17.31262
74	GLOBAL	MAXIMUM	-0.5316408e-09	0.	0.	0.2038520e-19	0.	0.2297468e-10
		TIME	18.07867	0.	0.	19.76397	0.	18.07867
75	GLOBAL	MAXIMUM	-0.4702983e-09	0.	0.	0.2075889e-19	0.	0.2014882e-10
		TIME	17.23602	0.	0.	19.76397	0.	17.23602
76	GLOBAL	MAXIMUM	-0.4147943e-09	0.	0.	0.2117573e-19	0.	0.1773069e-10
		TIME	17.23602	0.	0.	19.76397	0.	17.23602
77	GLOBAL	MAXIMUM	-0.5292191e-09	0.	0.	0.2163656e-19	0.	0.2260055e-10
		TIME	17.38923	0.	0.	19.76397	0.	17.38923
78	GLOBAL	MAXIMUM	0.	0.	0.	0.2214236e-19	0.	0.5076955e-11
		TIME	0.	0.	0.	19.76397	0.	19.76397
37	GLOBAL	MAXIMUM	0.	0.	-0.1585450e-15	-0.6928415e-17	0.	0.1444452e-12
		TIME	0.	0.	18.07867	18.07867	0.	19.76397
40	GLOBAL	MAXIMUM	0.	0.	0.	0.	0.	0.1373431e-10
		TIME	0.	0.	0.	0.	0.	17.31262
41	GLOBAL	MAXIMUM	0.	0.	-0.1321392e-30	0.	0.	0.1440416e-12
		TIME	0.	0.	18.07867	0.	0.	19.76397
43	GLOBAL	MAXIMUM	0.	0.	-0.6076571e-17	-0.2655461e-18	0.	0.5077087e-11
		TIME	0.	0.	19.76397	19.76397	0.	19.76397

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	-0.4941013e-08	-0.4573379e-25	0.1645153e-15	0.3038890e-26	-0.2183340e-08	0.1562508e-08
		TIME	17.31262	17.31262	18.07867	17.23602	17.23602	17.31262
4	GLOBAL	MAXIMUM	-0.5531511e-08	-0.5548016e-25	0.1647823e-15	-0.1958798e-26	0.1785038e-08	0.1837717e-08
		TIME	17.23602	17.23602	18.07867	19.07453	17.31262	17.23602
6	GLOBAL	MAXIMUM	-0.4835451e-08	-0.2604747e-24	0.1652278e-15	0.1217911e-24	-0.1902016e-08	0.1682480e-08
		TIME	17.23602	18.07867	18.07867	18.07867	18.15527	17.23602
7	GLOBAL	MAXIMUM	-0.7354046e-08	-0.4437363e-24	0.1654952e-15	0.6504820e-16	0.	0.2668410e-08
		TIME	17.31262	18.07867	18.07867	18.07867	0.	17.31262
8	GLOBAL	MAXIMUM	-0.7354130e-08	-0.2822923e-24	0.1658522e-15	-0.1198908e-24	0.6720790e-09	0.2544408e-08
		TIME	17.31262	18.07867	18.07867	18.07867	19.99378	17.31262
9	GLOBAL	MAXIMUM	-0.6647349e-08	-0.1359889e-25	0.1662091e-15	0.6532880e-16	0.	0.2420405e-08
		TIME	17.31262	17.31262	18.07867	18.07867	0.	17.31262
10	GLOBAL	MAXIMUM	-0.6241826e-08	-0.6561032e-25	0.1666561e-15	-0.1399223e-26	0.1101097e-08	0.2154836e-08
		TIME	17.23602	17.23602	18.07867	14.01863	17.46583	17.23602
12	GLOBAL	MAXIMUM	-0.6628030e-08	0.3897067e-24	0.1676404e-15	-0.2431344e-24	-0.9526634e-09	0.2280005e-08
		TIME	17.23602	18.07867	18.07867	18.07867	14.01863	17.23602
13	GLOBAL	MAXIMUM	-0.6919383e-08	0.8671016e-24	0.1681777e-15	0.6610257e-16	0.	0.2517654e-08
		TIME	17.31262	18.07867	18.07867	18.07867	0.	17.31262
14	GLOBAL	MAXIMUM	-0.7101817e-08	0.1696587e-23	0.1688061e-15	-0.4931147e-24	-0.5142666e-09	0.2472190e-08

		TIME	17.31262	18.07867	18.07867	18.07867	18.61490	17.31262
15	GLOBAL	MAXIMUM	-0.7347619e-08	0.2642313e-23	0.1694345e-15	0.6659656e-16	0.	0.2666748e-
		TIME	18.07867	18.07867	18.07867	18.07867	0.	18.07867
16	GLOBAL	MAXIMUM	-0.6457113e-08	0.2335616e-23	0.1701547e-15	0.1484720e-24	0.1639363e-08	0.2206347e-
		TIME	17.23602	18.07867	18.07867	18.07867	18.07867	17.23602
18	GLOBAL	MAXIMUM	-0.6552485e-08	0.2836747e-23	0.1717043e-15	-0.4144314e-24	0.3602497e-09	0.2191320e-
		TIME	17.23602	18.07867	18.07867	18.07867	14.86128	17.23602
20	GLOBAL	MAXIMUM	-0.6088067e-08	0.4485152e-23	0.1734567e-15	-0.5151683e-24	-0.1461417e-08	0.2086493e-
		TIME	17.31262	18.07867	18.07867	18.07867	17.38923	17.31262
21	GLOBAL	MAXIMUM	-0.7232656e-08	0.5454370e-23	0.1743797e-15	0.6854024e-16	0.	0.2616315e-
		TIME	17.38923	18.07867	18.07867	18.07867	0.	17.38923
22	GLOBAL	MAXIMUM	-0.4584858e-08	0.4531035e-23	0.1753970e-15	0.4916571e-24	0.1770014e-08	0.1556998e-
		TIME	18.07867	18.07867	18.07867	18.07867	17.38923	18.07867
23	GLOBAL	MAXIMUM	-0.1519235e-08	0.3684405e-23	0.1764143e-15	0.6933995e-16	0.	0.5965260e-
		TIME	19.76397	18.07867	18.07867	18.07867	0.	19.76397
45	GLOBAL	MAXIMUM	-0.4944112e-08	0.1848973e-24	0.5628166e-17	-0.3039076e-26	-0.2184283e-08	0.1568804e-
		TIME	17.31262	17.31262	19.76397	17.23602	17.23602	17.31262
46	GLOBAL	MAXIMUM	-0.7944377e-08	0.1302230e-25	0.5641317e-17	0.2217330e-17	0.	0.2893058e-
		TIME	17.23602	17.23602	19.76397	19.76397	0.	17.23602
47	GLOBAL	MAXIMUM	-0.5533701e-08	0.2187763e-24	0.5660329e-17	0.1958786e-26	0.1785455e-08	0.1840789e-
		TIME	17.23602	17.23602	19.76397	19.07453	17.31262	17.23602
48	GLOBAL	MAXIMUM	-0.3787873e-08	0.8240677e-26	0.5679342e-17	0.2232276e-17	0.	0.1377086e-
		TIME	18.00206	16.69979	19.76397	19.76397	0.	18.00206
49	GLOBAL	MAXIMUM	-0.4836482e-08	0.1962928e-24	0.5704255e-17	0.4177753e-26	-0.1901957e-08	0.1679157e-
		TIME	17.23602	17.23602	19.76397	19.76397	18.15527	17.23602
50	GLOBAL	MAXIMUM	-0.7352756e-08	0.1468059e-25	0.5729168e-17	0.2251860e-17	0.	0.2678246e-
		TIME	17.31262	19.91718	19.76397	19.76397	0.	17.31262
51	GLOBAL	MAXIMUM	-0.7355727e-08	0.3005855e-24	0.5760034e-17	-0.4798466e-26	0.6721445e-09	0.2549833e-
		TIME	17.31262	17.31262	19.76397	19.76397	19.99378	17.31262
52	GLOBAL	MAXIMUM	-0.6645788e-08	0.1359889e-25	0.5790900e-17	0.2276124e-17	0.	0.2421420e-
		TIME	17.31262	17.31262	19.76397	19.76397	0.	17.31262
53	GLOBAL	MAXIMUM	-0.6243334e-08	0.2566466e-24	0.5827782e-17	0.1399223e-26	0.1100827e-08	0.2153442e-
		TIME	17.23602	17.23602	19.76397	14.01863	17.46583	17.23602
54	GLOBAL	MAXIMUM	-0.5808481e-08	0.1241728e-25	0.5864665e-17	0.2305117e-17	0.	0.2116504e-
		TIME	17.23602	17.23602	19.76397	19.76397	0.	17.23602
55	GLOBAL	MAXIMUM	-0.6629707e-08	0.2802601e-24	0.5907641e-17	-0.9559021e-26	-0.9522861e-09	0.2280574e-
		TIME	17.23602	17.23602	19.76397	19.76397	14.01863	17.23602
56	GLOBAL	MAXIMUM	-0.6917875e-08	0.3825292e-25	0.5950617e-17	0.2338901e-17	0.	0.2520455e-
		TIME	17.31262	19.76397	19.76397	19.76397	0.	17.31262
57	GLOBAL	MAXIMUM	-0.7103215e-08	0.3103883e-24	0.5999776e-17	-0.1772779e-25	-0.5142574e-09	0.2474112e-
		TIME	17.31262	17.31262	19.76397	19.76397	18.61490	17.31262
58	GLOBAL	MAXIMUM	-0.7346336e-08	0.1020729e-24	0.6048935e-17	0.2377545e-17	0.	0.2677489e-
		TIME	18.07867	19.76397	19.76397	19.76397	0.	18.07867
59	GLOBAL	MAXIMUM	-0.6458742e-08	0.3098276e-24	0.6104379e-17	0.1020501e-25	0.1638962e-08	0.2222426e-
		TIME	17.23602	17.23602	19.76397	19.76397	18.07867	17.23602
60	GLOBAL	MAXIMUM	-0.6448587e-08	0.6533461e-25	0.6159823e-17	0.2421130e-17	0.	0.2349577e-
		TIME	17.23602	19.76397	19.76397	19.76397	0.	17.23602
61	GLOBAL	MAXIMUM	-0.6554733e-08	0.3184670e-24	0.6221666e-17	-0.1814532e-25	0.3602814e-09	0.2208868e-
		TIME	17.23602	17.23602	19.76397	19.76397	14.86128	17.23602
62	GLOBAL	MAXIMUM	-0.5676321e-08	0.1306577e-24	0.6283510e-17	0.2469745e-17	0.	0.2068159e-
		TIME	17.23602	19.76397	19.76397	19.76397	0.	17.23602
63	GLOBAL	MAXIMUM	-0.6089652e-08	0.3404305e-24	0.6351883e-17	-0.2020130e-25	-0.1460894e-08	0.2090375e-
		TIME	17.31262	17.23602	19.76397	19.76397	17.38923	17.31262
64	GLOBAL	MAXIMUM	-0.7231548e-08	0.2033823e-24	0.6420255e-17	0.2523493e-17	0.	0.2632789e-
		TIME	17.38923	19.76397	19.76397	19.76397	0.	17.38923
65	GLOBAL	MAXIMUM	-0.4586452e-08	0.2488353e-24	0.6495299e-17	0.1818681e-25	0.1772379e-08	0.1557883e-
		TIME	18.07867	18.07867	19.76397	19.76397	17.38923	18.07867
66	GLOBAL	MAXIMUM	-0.1506345e-08	0.1379096e-24	0.6570342e-17	0.2582485e-17	0.	0.5920123e-
		TIME	19.76397	19.76397	19.76397	19.76397	0.	19.76397

36	GLOBAL	MAXIMUM	-0.1515281e-08	0.2837288e-29	-0.1449655e-12	-0.5715717e-13	0.8574212e-28	0.5980649e-09
		TIME	19.76397	18.07867	18.07867	18.07867	18.07867	19.76397
38	GLOBAL	MAXIMUM	-0.1113716e-08	0.1534715e-29	0.	0.	0.	0.4327576e-09
		TIME	17.31262	17.31262	0.	0.	0.	17.31262
39	GLOBAL	MAXIMUM	-0.1511047e-08	0.6992668e-27	-0.1208213e-27	-0.4763759e-28	-0.8563291e-28	0.5963939e-09
		TIME	19.76397	19.76397	18.07867	18.07867	18.07867	19.76397
42	GLOBAL	MAXIMUM	-0.1506533e-08	0.1554293e-27	-0.8487254e-16	-0.3097090e-16	0.	0.5921455e-09
		TIME	19.76397	19.76397	19.76397	19.76397	0.	19.76397

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
1	GLOBAL	MAXIMUM	-0.4666948e-06	-0.2015570e-24	0.3912636e-13	0.1537869e-13	0.	0.1834869e-06
		TIME	17.00620	19.38095	19.91718	19.91718	0.	17.00620
3	GLOBAL	MAXIMUM	0.9165650e-06	0.1368146e-23	0.3916872e-13	0.1539534e-13	0.	-0.3298159e-06
		TIME	16.77639	16.77639	19.91718	19.91718	0.	16.77639
5	GLOBAL	MAXIMUM	-0.6825600e-06	-0.1108845e-23	0.3925348e-13	0.1542865e-13	0.	0.2457869e-06
		TIME	19.99378	19.99378	19.91718	19.91718	0.	19.99378
11	GLOBAL	MAXIMUM	0.4273670e-06	-0.8262143e-24	0.3976331e-13	0.1562904e-13	0.	-0.1546418e-06
		TIME	19.53415	19.38095	19.91718	19.91718	0.	19.53415
17	GLOBAL	MAXIMUM	0.5132022e-06	0.5028950e-21	0.4066083e-13	0.1596928e-13	0.	-0.1860619e-06
		TIME	16.69979	19.91718	19.91718	19.91718	0.	16.69979
19	GLOBAL	MAXIMUM	0.5666191e-06	0.8583246e-21	0.4105562e-13	0.1613699e-13	0.	-0.2040746e-06
		TIME	16.69979	19.91718	19.91718	19.91718	0.	16.69979
44	GLOBAL	MAXIMUM	-0.4679867e-06	0.2015666e-24	0.2946263e-14	0.1158034e-14	0.	0.1839483e-06
		TIME	17.00620	19.38095	19.91718	19.91718	0.	17.00620
24	GLOBAL	MAXIMUM	0.	0.	0.	0.1318577e-15	0.	0.1572344e-08
		TIME	0.	0.	0.	19.91718	0.	17.00620
25	GLOBAL	MAXIMUM	0.7040136e-07	0.	0.	0.1320004e-15	0.	-0.2875162e-08
		TIME	16.77639	0.	0.	19.91718	0.	16.77639
26	GLOBAL	MAXIMUM	0.5390802e-07	0.	0.	0.1322861e-15	0.	0.2134595e-08
		TIME	19.84057	0.	0.	19.91718	0.	19.99378
27	GLOBAL	MAXIMUM	-0.3586776e-07	0.	0.	0.1327149e-15	0.	-0.1421551e-08
		TIME	19.38095	0.	0.	19.91718	0.	19.53415
28	GLOBAL	MAXIMUM	-0.3569545e-07	0.	0.	0.1332874e-15	0.	0.1363137e-08
		TIME	15.32090	0.	0.	19.91718	0.	15.32090
29	GLOBAL	MAXIMUM	0.3642221e-07	0.	0.	0.1340042e-15	0.	-0.1332860e-08
		TIME	16.69979	0.	0.	19.91718	0.	19.53415
30	GLOBAL	MAXIMUM	-0.3529837e-07	0.	0.	0.1348661e-15	0.	0.1348328e-08
		TIME	15.32090	0.	0.	19.91718	0.	15.32090
31	GLOBAL	MAXIMUM	0.3439166e-07	0.	0.	0.1358740e-15	0.	-0.1364223e-08
		TIME	18.07867	0.	0.	19.91718	0.	18.07867
32	GLOBAL	MAXIMUM	0.3887743e-07	0.	0.	0.1621033e-15	0.	-0.1893271e-08
		TIME	16.69979	0.	0.	19.91718	0.	16.69979
33	GLOBAL	MAXIMUM	0.4663073e-07	0.	0.	0.1383594e-15	0.	-0.1755002e-0
		TIME	16.69979	0.	0.	19.91718	0.	16.69979
34	GLOBAL	MAXIMUM	0.3995158e-07	0.	0.	0.1398396e-15	0.	-0.1597741e-0
		TIME	16.77639	0.	0.	19.91718	0.	16.77639
35	GLOBAL	MAXIMUM	0.	0.	0.	0.1414712e-15	0.	0.1828815e-0
		TIME	0.	0.	0.	19.91718	0.	19.91718
67	GLOBAL	MAXIMUM	0.	0.	0.	0.9929046e-17	0.	0.1577092e-0
		TIME	0.	0.	0.	19.91718	0.	17.00620
68	GLOBAL	MAXIMUM	0.6903485e-07	0.	0.	0.9975556e-17	0.	-0.2861468e-0
		TIME	16.77639	0.	0.	19.91718	0.	16.77639
69	GLOBAL	MAXIMUM	0.5312079e-07	0.	0.	0.1004279e-16	0.	0.2127906e-0
		TIME	19.84057	0.	0.	19.91718	0.	19.99378

70	GLOBAL	MAXIMUM	-0.3553709e-07	0.	0.	0.1013090e-16	0.	-0.1415098e-0
		TIME	19.38095	0.	0.	19.91718	0.	19.53415
71	GLOBAL	MAXIMUM	-0.3542228e-07	0.	0.	0.1024006e-16	0.	0.1359649e-0
		TIME	15.32090	0.	0.	19.91718	0.	15.32090
72	GLOBAL	MAXIMUM	0.3629228e-07	0.	0.	0.1037050e-16	0.	-0.1331038e-0
		TIME	16.69979	0.	0.	19.91718	0.	19.53415
73	GLOBAL	MAXIMUM	-0.3507687e-07	0.	0.	0.1052249e-16	0.	0.1345454e-0
		TIME	15.32090	0.	0.	19.91718	0.	15.32090
74	GLOBAL	MAXIMUM	0.3392119e-07	0.	0.	0.1069635e-16	0.	-0.1358432e-0
		TIME	18.07867	0.	0.	19.91718	0.	18.07867
75	GLOBAL	MAXIMUM	0.4259178e-07	0.	0.	0.1089243e-16	0.	-0.1586867e-0
		TIME	16.69979	0.	0.	19.91718	0.	16.69979
76	GLOBAL	MAXIMUM	0.4648228e-07	0.	0.	0.1111115e-16	0.	-0.1754287e-0
		TIME	16.69979	0.	0.	19.91718	0.	16.69979
77	GLOBAL	MAXIMUM	0.3933165e-07	0.	0.	0.1135295e-16	0.	-0.1591027e-0
		TIME	16.77639	0.	0.	19.91718	0.	16.77639
78	GLOBAL	MAXIMUM	0.	0.	0.	0.1161835e-16	0.	0.1807163e-0
		TIME	0.	0.	0.	19.91718	0.	19.91718
37	GLOBAL	MAXIMUM	0.	0.	-0.3772687e-13	-0.1648664e-14	0.	0.5136429e-1
		TIME	0.	0.	19.91718	19.91718	0.	19.91718
40	GLOBAL	MAXIMUM	0.	0.	-0.6174253e-31	0.	0.	0.5757852e-0
		TIME	0.	0.	19.91718	0.	0.	17.00620
41	GLOBAL	MAXIMUM	0.	0.	-0.3148211e-28	-0.1375768e-29	0.	0.5123952e-1
		TIME	0.	0.	19.91718	19.91718	0.	19.91718
43	GLOBAL	MAXIMUM	0.	0.	-0.3188447e-14	-0.1393351e-15	0.	0.1806590e-0
		TIME	0.	0.	19.91718	19.91718	0.	19.91718

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	-0.7342407e-06	-0.5301737e-23	0.3914754e-13	-0.3253398e-24	0.3572125e-06	0.1904385e-0
		TIME	17.00620	17.00620	19.91718	16.77639	16.77639	17.00620
4	GLOBAL	MAXIMUM	0.6414214e-06	0.6316167e-23	0.3921110e-13	-0.3454671e-24	0.3003174e-06	-0.2104761e-0
		TIME	16.77639	16.69979	19.91718	17.54244	17.54244	16.69979
6	GLOBAL	MAXIMUM	0.4660398e-06	0.5354965e-22	0.3931710e-13	0.2854227e-22	-0.2231199e-06	-0.1495047e-0
		TIME	16.69979	19.45755	19.91718	19.91718	18.46169	16.69979
7	GLOBAL	MAXIMUM	0.4542726e-06	-0.1025539e-21	0.3938073e-13	0.1547867e-13	0.	-0.1636178e-0
		TIME	19.53415	19.91718	19.91718	19.91718	0.	19.53415
8	GLOBAL	MAXIMUM	-0.4300846e-06	0.5333494e-22	0.3946567e-13	-0.2852991e-22	-0.9980677e-07	0.1441837e-0
		TIME	19.38095	19.45755	19.91718	19.91718	19.99378	19.38095
9	GLOBAL	MAXIMUM	-0.4388036e-06	-0.8012672e-24	0.3955061e-13	0.1554544e-13	0.	0.1578962e-0
		TIME	15.32090	15.32090	19.91718	19.91718	0.	15.32090
10	GLOBAL	MAXIMUM	-0.4062240e-06	-0.4238539e-23	0.3965696e-13	-0.1212582e-24	0.1014777e-06	0.1394636e-0
		TIME	19.38095	19.38095	19.91718	17.69564	17.69564	19.38095
12	GLOBAL	MAXIMUM	-0.4208012e-06	0.1060205e-21	0.3989118e-13	-0.5803338e-22	-0.7526130e-07	0.1440318e-0
		TIME	19.38095	19.91718	19.91718	19.91718	13.71221	19.38095
13	GLOBAL	MAXIMUM	-0.4342823e-06	0.2092694e-21	0.4001905e-13	0.1572956e-13	0.	0.1563823e-0
		TIME	15.32090	19.91718	19.91718	19.91718	0.	15.32090
14	GLOBAL	MAXIMUM	-0.4054170e-06	0.4216144e-21	0.4016859e-13	-0.1174801e-21	0.6023486e-07	0.1393132e-0
		TIME	19.38095	19.91718	19.91718	19.91718	18.61490	19.38095
15	GLOBAL	MAXIMUM	0.4368331e-06	0.6321973e-21	0.4031812e-13	0.1584711e-13	0.	-0.1572420e-0
		TIME	18.07867	19.91718	19.91718	19.91718	0.	18.07867
16	GLOBAL	MAXIMUM	0.4089040e-06	0.5688044e-21	0.4048948e-13	0.3591731e-22	0.1442038e-06	-0.1410119e-0
		TIME	16.69979	19.91718	19.91718	19.91718	17.77225	16.69979
18	GLOBAL	MAXIMUM	0.5833313e-06	0.6819635e-21	0.4085822e-13	-0.9873053e-22	0.5314412e-07	-0.1950682e-0
		TIME	16.69979	19.91718	19.91718	19.91718	18.07867	16.69979

20	GLOBAL	MAXIMUM	0.4955882e-06	0.1081259e-20	0.4127523e-13	-0.1229557e-21	0.1214715e-06	-0.1716669e-06
		TIME	16.69979	19.91718	19.91718	19.91718	17.38923	16.69979
21	GLOBAL	MAXIMUM	0.5111728e-06	0.1300965e-20	0.4149485e-13	0.1630963e-13	0.	-0.1840729e-06
		TIME	16.77639	19.91718	19.91718	19.91718	0.	16.77639
22	GLOBAL	MAXIMUM	-0.4054592e-06	0.1087385e-20	0.4173692e-13	0.1177267e-21	0.2088993e-06	0.1262837e-06
		TIME	17.08281	19.91718	19.91718	19.91718	19.76397	17.08281
23	GLOBAL	MAXIMUM	-0.5399991e-06	0.8771486e-21	0.4197899e-13	0.1649992e-13	-0.3462268e-29	0.2111898e-06
		TIME	19.91718	19.91718	19.91718	19.91718	19.91718	19.91718
45	GLOBAL	MAXIMUM	-0.7352834e-06	0.2224629e-22	0.2953164e-14	0.3251220e-24	0.3576144e-06	0.1910197e-06
		TIME	17.00620	17.00620	19.91718	16.77639	16.77639	17.00620
46	GLOBAL	MAXIMUM	0.9174115e-06	-0.1368146e-23	0.2960064e-14	0.1163459e-14	0.1760021e-29	-0.3331738e-06
		TIME	16.77639	16.77639	19.91718	19.91718	19.45755	16.77639
47	GLOBAL	MAXIMUM	0.6418983e-06	-0.2504383e-22	0.2970040e-14	0.3454661e-24	0.3006460e-06	-0.2111144e-06
		TIME	16.77639	16.69979	19.91718	17.54244	17.54244	16.69979
48	GLOBAL	MAXIMUM	-0.6834626e-06	0.1108845e-23	0.2980016e-14	0.1171301e-14	0.1763898e-29	0.2478562e-06
		TIME	19.99378	19.99378	19.91718	19.91718	19.45755	19.99378
49	GLOBAL	MAXIMUM	0.4662718e-06	-0.1915437e-22	0.2993088e-14	0.2215073e-23	-0.2232831e-06	-0.1495463e-06
		TIME	16.69979	16.69979	19.91718	19.91718	18.46169	16.69979
50	GLOBAL	MAXIMUM	0.4542980e-06	-0.8172580e-23	0.3006160e-14	0.1181577e-14	0.1769699e-29	-0.1648213e-06
		TIME	19.53415	19.91718	19.91718	19.91718	19.45755	19.53415
51	GLOBAL	MAXIMUM	-0.4302161e-06	0.1625226e-22	0.3022356e-14	-0.2227441e-23	-0.9982953e-07	0.1444312e-06
		TIME	19.38095	19.38095	19.91718	19.91718	19.99378	19.38095
52	GLOBAL	MAXIMUM	-0.4387326e-06	0.8012672e-24	0.3038552e-14	0.1194308e-14	0.1777431e-29	0.1584661e-06
		TIME	15.32090	15.32090	19.91718	19.91718	19.45755	15.32090
53	GLOBAL	MAXIMUM	-0.4063121e-06	0.1660745e-22	0.3057905e-14	0.1212582e-24	0.1015004e-06	0.1394282e-06
		TIME	19.38095	19.38095	19.91718	17.69564	17.69564	19.38095
54	GLOBAL	MAXIMUM	0.4275610e-06	0.8262143e-24	0.3077257e-14	0.1209522e-14	0.1787103e-29	-0.1551575e-06
		TIME	19.53415	19.38095	19.91718	19.91718	19.45755	19.53415
55	GLOBAL	MAXIMUM	-0.4208980e-06	0.1900103e-22	0.3099807e-14	-0.4576334e-23	-0.7524716e-07	0.1440770e-06
		TIME	19.38095	19.38095	19.91718	19.91718	13.71221	19.38095
56	GLOBAL	MAXIMUM	-0.4342028e-06	0.1612554e-22	0.3122357e-14	0.1227248e-14	0.1798724e-29	0.1568324e-06
		TIME	15.32090	19.91718	19.91718	19.91718	19.45755	15.32090
57	GLOBAL	MAXIMUM	-0.4055018e-06	0.3173419e-22	0.3148152e-14	-0.9266100e-23	0.6023693e-07	0.1393059e-06
		TIME	19.38095	17.08281	19.91718	19.91718	18.61490	19.38095
58	GLOBAL	MAXIMUM	0.4367683e-06	0.4948348e-22	0.3173946e-14	0.1247525e-14	0.1812308e-29	-0.1582435e-06
		TIME	18.07867	19.91718	19.91718	19.91718	19.45755	18.07867
59	GLOBAL	MAXIMUM	0.4089880e-06	0.3814832e-22	0.3203038e-14	0.4448893e-23	0.1442293e-06	-0.1402663e-06
		TIME	16.69979	17.08281	19.91718	19.91718	17.77225	16.69979
60	GLOBAL	MAXIMUM	0.5133997e-06	0.3346748e-22	0.3232130e-14	0.1270395e-14	0.1827871e-29	-0.1850258e-06
		TIME	16.69979	19.91718	19.91718	19.91718	19.45755	16.69979
61	GLOBAL	MAXIMUM	0.5835302e-06	0.4478625e-22	0.3264580e-14	-0.9750078e-23	0.5318344e-07	-0.1947834e-06
		TIME	16.69979	19.91718	19.91718	19.91718	18.07867	16.69979
62	GLOBAL	MAXIMUM	0.5669549e-06	0.6856773e-22	0.3297030e-14	0.1295904e-14	0.1845787e-29	-0.2045410e-06
		TIME	16.69979	19.91718	19.91718	19.91718	19.45755	16.69979
63	GLOBAL	MAXIMUM	0.4956722e-06	0.7954657e-22	0.3332906e-14	-0.1022884e-22	0.1215172e-06	-0.1718477e-06
		TIME	16.69979	19.91718	19.91718	19.91718	17.38923	16.69979
64	GLOBAL	MAXIMUM	0.5111473e-06	0.1053915e-21	0.3368782e-14	0.1324106e-14	0.1865717e-29	-0.1853321e-06
		TIME	16.77639	19.91718	19.91718	19.91718	19.45755	16.77639
65	GLOBAL	MAXIMUM	-0.4057884e-06	0.9643996e-22	0.3408158e-14	0.9248439e-23	0.2082334e-06	0.1256927e-06
		TIME	17.08281	19.91718	19.91718	19.91718	19.76397	17.08281
66	GLOBAL	MAXIMUM	-0.5359738e-06	0.7209713e-22	0.3447534e-14	0.1355060e-14	0.	0.2105589e-06
		TIME	19.91718	19.91718	19.91718	19.91718	0.	19.91718
36	GLOBAL	MAXIMUM	-0.5388294e-06	0.7454692e-27	-0.3449554e-10	-0.1360094e-10	0.2040293e-25	0.2126701e-06
		TIME	19.91718	19.91718	19.91718	19.91718	19.91718	19.91718
38	GLOBAL	MAXIMUM	-0.4669047e-06	0.5652016e-27	-0.2805356e-30	0.	0.	0.1814256e-06
		TIME	17.00620	17.00620	19.91718	0.	0.	17.00620
39	GLOBAL	MAXIMUM	-0.5375205e-06	0.2487314e-24	-0.2878564e-25	-0.1134964e-25	-0.2037694e-25	0.2121535e-06
		TIME	19.91718	19.91718	19.91718	19.91718	19.91718	19.91718

```
 42        GLOBAL     MAXIMUM   -0.5360726e-06   0.5528458e-25  -0.4453360e-13  -0.1625079e-13  -0.2903169e-29   0.2107043e-0
                       TIME        19.91718        19.91718        19.91718        19.91718        19.91718        19.91718
 (  172) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  172) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  172) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  172) >  $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  172) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:26:50.8          Elapsed time: 1:23:41.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  10 pools of 524288 bytes total 5242880 bytes (3943%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 3, R_Get 70, R_Put 1, R_Del 1
 B_Read 5, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 1 TRAFFIC INDUCED VIBRATIONS
AMPLITUDE 0.0054 FREQUENCY 15.6621

**** ACTIVE UNITS - LENGTH WEIGHT ANGLE TEMPERATURE TIME
**** ASSUMED TO BE INCH POUND RADIAN FAHRENHEIT SECOND

```
{    2) > units m n
{    3) > type space frame
{    4) > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

```
{    5) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

```
{    6) > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

```
{    7} > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
{    8} > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
{    9} > joints coordinates
{   10} > 36 3.6 3.8 39.6 F
{   11} > 37 3.6 0.0 39.6 S
{   12} > 38 7.2 3.8 0.0 F
{   13} > 39 7.2 3.8 39.6 F
{   14} > 40 7.2 0.0 0.0 S
{   15} > 41 7.2 0.0 39.6 S
{   16} > 42 10.8 3.8 39.6 F
{   17} > 43 10.8 0.0 39.6 S
{   18} > member incidences
{   19} > 'b1' 1 2
{   20} > 'b2' 2 3
{   21} > 'b3' 3 4
{   22} > 'b4' 4 5
{   23} > 'b5' 5 6
{   24} > 'b6' 6 7
{   25} > 'b7' 7 8
{   26} > 'b8' 8 9
{   27} > 'b9' 9 10
{   28} > 'b10' 10 11
{   29} > 'b11' 11 12
{   30} > 'b12' 12 13
{   31} > 'b13' 13 14
{   32} > 'b14' 14 15
{   33} > 'b15' 15 16
{   34} > 'b16' 16 17
{   35} > 'b17' 17 18
{   36} > 'b18' 18 19
{   37} > 'b19' 19 20
{   38} > member incidences
{   39} > 'b20' 20 21
{   40} > 'b21' 21 22
{   41} > 'b22' 22 23
{   42} > 'ba23'  1 38
{   43} > 'ba24' 38 44
{   44} > 'bb25'  2 45
{   45} > 'bb26'  3 46
{   46} > 'bb27'  4 47
{   47} > 'bb28'  5 48
{   48} > 'bb29'  6 49
{   49} > 'bb30'  7 50
{   50} > 'bb31'  8 51
{   51} > 'bb32'  9 52
{   52} > 'bb33' 10 53
{   53} > 'bb34' 11 54
{   54} > 'bb35' 12 55
{   55} > 'bb36' 13 56
{   56} > 'bb37' 14 57
{   57} > 'bb38' 15 58
{   58} > 'bb39' 16 59
{   59} > 'bb40' 17 60
{   60} > 'bb41' 18 61
{   61} > member incidences
{   62} > 'bb42' 19 62
{   63} > 'bb43' 20 63
{   64} > 'bb44' 21 64
{   65} > 'bb45' 22 65
{   66} > 'bc46' 23 36
{   67} > 'bc47' 36 39
{   68} > 'bc48' 39 42
{   69} > 'bc49' 42 66
{   70} > 'bd50' 44 45
{   71} > 'bd51' 45 46
{   72} > 'bd52' 46 47
{   73} > 'bd53' 47 48
{   74} > 'bd54' 48 49
{   75} > 'bd55' 49 50
{   76} > 'bd56' 50 51
```

```
{   77) > 'bd57' 51 52
{   78) > 'bd58' 52 53
{   79) > 'bd59' 53 54
{   80) > 'bd60' 54 55
{   81) > 'bd61' 55 56
{   82) > 'bd62' 56 57
{   83) > 'bd63' 57 58
{   84) > 'bd64' 58 59
{   85) > 'bd65' 59 60
{   86) > 'bd66' 60 61
{   87) > 'bd67' 61 62
{   88) > 'bd68' 62 63
{   89) > 'bd69' 63 64
{   90) > 'bd70' 64 65
{   91) > member incidences
{   92) > 'bd71' 65 66
{   93) > 's72'  24  1
{   94) > 's73'  25  3
{   95) > 's74'  26  5
{   96) > 's75'  27  7
{   97) > 's76'  28  9
{   98) > 's77'  29 11
{   99) > 's78'  30 13
{  100) > 's79'  31 15
{  101) > 's80'  32 17
{  102) > 's81'  33 19
{  103) > 's82'  34 21
{  104) > 's83'  35 23
{  105) > 's84'  37 36
{  106) > 's85'  40 38
{  107) > 's86'  41 39
{  108) > 's87'  43 42
{  109) > 's88'  67 44
{  110) > 's89'  68 46
{  111) > 's90'  69 48
{  112) > 's91'  70 50
{  113) > 's92'  71 52
{  114) > 's93'  72 54
{  115) > 's94'  73 56
{  116) > 's95'  74 58
{  117) > 's96'  75 60
{  118) > 's97'  76 62
{  119) > 's98'  77 64
{  120) > 's99'  78 66
{  121) >
{  121) > joint releases
{  122) > 25 to 34 kfx 1.15E7
{  123) > 68 to 77 kfx 1.15E7
{  124) > 40 37 41 43 kfz 1.15E7
{  125) > 1 for y for z mom x mom y mom z kfx  3.2574E6
{  126) > 3 for y for z mom x mom y mom z kfx 7.0822E5
{  127) > 5 for y for z mom x mom y mom z kfx 2.1247E6
{  128) > 11 for y for z mom x mom y mom z kfx 7.0822E5
{  129) > 17 for y for z mom x mom y mom z kfx 7.0822E5
{  130) > 19 for y for z mom x mom y mom z kfx 1.11225E6
{  131) > 44 for x for y mom x mom y mom z kfz 1.11225E6
{  132) > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
{  133) > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
{  134) >
{  134) > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
{  135) >
{  135) > member releases
{  136) > 'bb25' to 'bb45' start          moment x y z end moment y z
{  137) > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
{  138) > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
{  139) > 'ba23' 'ba24' start mom x y z end mom z y
{  140) > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
{  141) > member eccentricities
{  142) > 'bb25' to 'bb45' start x 0.15
{  143) > member properties prismatic
{  144) > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
{  145) > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
{  146) > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
{  147) > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
{  148) > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
{  149) > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
{  150) > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
{  151) > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
{  152) > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
{  153) > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
{  154) > material constants
{  155) > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
{  156) > material concrete 's85' 's80' 'bb25' to 'bb45'
{  157) > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
{  158) > material steel 'bd50' to 'bd71'
{  159) > constants beta 0.0 all
{  160) > dead load 'dl' direction -y all members
{  161) > damping percents 2.5 50
```

```
(  162) > inertia of joints lumped
(  163) > dynamic degrees of freedom with static condensation
(  164) > generate  70 from joints translations x

(  165) >   dynamic loading 1
(  166) >   support acceleration
(  167) >   transl x function  sin ampl 0.00540 freq 98.425293 phase 0.0
(  168) >   integrate from 0.0 to  20.00 at 0.07660452

(  169) >    end of dynamic loading
(  170) >    dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS   72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                      19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS    16.383
                                              ----------
                                               35.690
                                              ==========



 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                       2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS     1.021
                                              ----------
                                                3.572
                                              ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.43 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.38 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES     1.90 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.41 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.30 SECONDS
 TIME TO PROCESS   78 JOINTS                      4.06 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.38 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.65 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        9.78 SECONDS
 TIME FOR CONDENSATION                          232.41 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.33 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.13 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.63 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.18 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.35 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.13 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        94.21 SECONDS

 *************************
 * EIGEN-SOLUTION CHECKS *
 *************************


 MODE------EIGENVALUE-------FREQUENCY-------FREQUENCY--------PERIOD--------ESTIMATED---/
         ((RAD/SEC)**2)      (RAD/SEC)        (CYC/SEC)        (SEC/CYC)       ACCURACY

    1     6.727454d+01    8.202106d+00    1.305406d+00    7.660454d-01    1.682314d-10
    2     6.954759d+01    8.339520d+00    1.327276d+00    7.534229d-01    1.715818d-10
    3     7.757453d+01    8.807640d+00    1.401780d+00    7.133790d-01    5.332525d-11
    4     8.785211d+01    9.372946d+00    1.491751d+00    6.703533d-01    1.053954d-10
    5     9.546691d+01    9.770717d+00    1.555058d+00    6.430629d-01    9.126849d-11
    6     1.111998d+02    1.054513d+01    1.678310d+00    5.958377d-01    4.898725d-11
    7     1.195056d+02    1.093186d+01    1.739860d+00    5.747590d-01    4.387047d-11
    8     1.396344d+02    1.181670d+01    1.880686d+00    5.317208d-01    4.177525d-11
    9     1.677455d+02    1.295166d+01    2.061321d+00    4.851258d-01    1.219794d-12
   10     2.066677d+02    1.437594d+01    2.288002d+00    4.370625d-01    3.011305d-11
   11     4.878849d+02    2.208812d+01    3.515433d+00    2.844600d-01    2.553983d-11
   12     8.257434d+02    2.873575d+01    4.573437d+00    2.186539d-01    1.439964d-12
   13     1.399263d+03    3.740672d+01    5.953465d+00    1.679694d-01    1.660736d-12
   14     1.500251d+03    3.873308d+01    6.164561d+00    1.622176d-01    7.436474d-12
   15     1.649781d+03    4.061750d+01    6.464476d+00    1.546916d-01    7.459423d-12
   16     1.838761d+03    4.288077d+01    6.824687d+00    1.465269d-01    1.807695d-12
   17     2.046501d+03    4.523827d+01    7.199894d+00    1.388909d-01    4.440182d-13
   18     2.254418d+03    4.748071d+01    7.556789d+00    1.323313d-01    2.205616d-12
   19     2.446104d+03    4.945810d+01    7.871501d+00    1.270406d-01    3.810084d-12
   20     2.586623d+03    5.085885d+01    8.094437d+00    1.235416d-01    2.089889d-12
   21     2.674139d+03    5.171207d+01    8.230232d+00    1.215033d-01    2.045214d-12
   22     3.563408d+03    5.969429d+01    9.500641d+00    1.052561d-01    3.623298d-13
   23     4.780143d+03    6.913858d+01    1.100375d+01    9.087814d-02    1.458916d-12
   24     2.609301d+04    1.615333d+02    2.570882d+01    3.889715d-02    2.697309d-13
```

25	2.806204d+04	1.675173d+02	2.666120d+01	3.750769d-02	2.082313d-13
26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 48.90 SECONDS

TIME TO COMPUTE TIME HISTORY RESPONSE 1017.26 SECONDS
(171) > list dynamic max dis max acc times all joints all
1

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - test1 TITLE - NONE GIVEN

ACTIVE UNITS M N RAD DEGF SEC

LOADING - 2

MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATI
1	GLOBAL	MAXIMUM	-0.7517999e-05	0.2238379e-22	0.1875411e-11	0.7371338e-12	0.	0.2945422e
		TIME	0.8426498	0.4596272	1.608695	1.608695	0.	0.8426498
3	GLOBAL	MAXIMUM	0.8540087e-04	0.1464467e-21	0.1877441e-11	0.7379318e-12	0.	-0.3101742e
		TIME	0.4596272	0.4596272	1.608695	1.608695	0.	0.4596272
5	GLOBAL	MAXIMUM	0.7213152e-04	0.1223458e-21	0.1881504e-11	0.7395286e-12	0.	-0.2619387e
		TIME	1.608695	1.608695	1.608695	1.608695	0.	1.608695
11	GLOBAL	MAXIMUM	0.5595096e-04	0.1099414e-21	0.1905941e-11	0.7491338e-12	0.	-0.2043063e
		TIME	0.4596272	0.4596272	1.608695	1.608695	0.	0.4596272
17	GLOBAL	MAXIMUM	0.6237582e-04	0.2414904e-19	0.1948962e-11	0.7654420e-12	0.	-0.2247812e
		TIME	0.4596272	1.608695	1.608695	1.608695	0.	0.4596272
19	GLOBAL	MAXIMUM	0.5618168e-04	0.4116999e-19	0.1967884e-11	0.7734806e-12	0.	-0.2058681e
		TIME	0.4596272	1.608695	1.608695	1.608695	0.	0.4596272
44	GLOBAL	MAXIMUM	-0.7537434e-05	-0.2237807e-22	0.8364816e-13	0.3287806e-13	0.3608734e-29	0.2961659e
		TIME	0.8426498	0.4596272	0.4596272	0.4596272	0.4596272	0.8426498
24	GLOBAL	MAXIMUM	0.	0.	0.	0.6320224e-14	0.	0.2541712e
		TIME	0.	0.	0.	1.608695	0.	0.8426498
25	GLOBAL	MAXIMUM	0.6063952e-05	0.	0.	0.6327066e-14	0.	-0.2687812e
		TIME	0.4596272	0.	0.	1.608695	0.	0.4596272
26	GLOBAL	MAXIMUM	0.5112742e-05	0.	0.	0.6340758e-14	0.	-0.2271145e
		TIME	1.608695	0.	0.	1.608695	0.	1.608695
27	GLOBAL	MAXIMUM	0.4653410e-05	0.	0.	0.6361313e-14	0.	-0.2058905e
		TIME	0.5362316	0.	0.	1.608695	0.	0.5362316
28	GLOBAL	MAXIMUM	-0.4749575e-05	0.	0.	0.6388755e-14	0.	0.2100189e
		TIME	0.9958588	0.	0.	1.608695	0.	0.9958588
29	GLOBAL	MAXIMUM	0.3875122e-05	0.	0.	0.6423113e-14	0.	-0.1758200e
		TIME	0.4596272	0.	0.	1.608695	0.	0.4596272
30	GLOBAL	MAXIMUM	-0.4093082e-05	0.	0.	0.6464424e-14	0.	0.1824906e
		TIME	0.9958588	0.	0.	1.608695	0.	0.9958588
31	GLOBAL	MAXIMUM	-0.4744526e-05	0.	0.	0.6512733e-14	0.	0.2098741e
		TIME	0.9958588	0.	0.	1.608695	0.	0.9958588
32	GLOBAL	MAXIMUM	0.5069819e-05	0.	0.	0.7769960e-14	0.	-0.2287486e
		TIME	0.4596272	0.	0.	1.608695	0.	0.4596272
33	GLOBAL	MAXIMUM	0.3858186e-05	0.	0.	0.6631864e-14	0.	-0.1761544e
		TIME	0.4596272	0.	0.	1.608695	0.	0.4596272
34	GLOBAL	MAXIMUM	0.5729768e-05	0.	0.	0.6702814e-14	0.	-0.2543081e
		TIME	1.225672	0.	0.	1.608695	0.	1.225672

35	GLOBAL	MAXIMUM	0.	0.	0.	0.6781020e-14	0.	0.7185105e-0
		TIME	0.	0.	0.	1.608695	0.	1.608695
67	GLOBAL	MAXIMUM	0.	0.	0.	0.2818982e-15	0.	0.2540953e-0
		TIME	0.	0.	0.	0.4596272	0.	0.8426498
68	GLOBAL	MAXIMUM	0.5983998e-05	0.	0.	0.2832187e-15	0.	-0.2678771e-0
		TIME	0.4596272	0.	0.	0.4596272	0.	0.4596272
69	GLOBAL	MAXIMUM	0.5046360e-05	0.	0.	0.2851277e-15	0.	-0.2265277e-0
		TIME	1.608695	0.	0.	0.4596272	0.	1.608695
70	GLOBAL	MAXIMUM	0.4603083e-05	0.	0.	0.2876292e-15	0.	-0.2052574e-0
		TIME	0.5362316	0.	0.	0.4596272	0.	0.5362316
71	GLOBAL	MAXIMUM	-0.4700579e-05	0.	0.	0.2907284e-15	0.	0.2094011e-0
		TIME	0.9958588	0.	0.	0.4596272	0.	0.9958588
72	GLOBAL	MAXIMUM	0.3857533e-05	0.	0.	0.2944317e-15	0.	-0.1756448e-0
		TIME	0.4596272	0.	0.	0.4596272	0.	0.4596272
73	GLOBAL	MAXIMUM	-0.4071949e-05	0.	0.	0.2987469e-15	0.	0.1822064e-0
		TIME	0.9958588	0.	0.	0.4596272	0.	0.9958588
74	GLOBAL	MAXIMUM	-0.4696215e-05	0.	0.	0.3036829e-15	0.	0.2092607e-0
		TIME	0.9958588	0.	0.	0.4596272	0.	0.9958588
75	GLOBAL	MAXIMUM	0.4319435e-05	0.	0.	0.3092499e-15	0.	-0.1957591e-0
		TIME	0.4596272	0.	0.	0.4596272	0.	0.4596272
76	GLOBAL	MAXIMUM	0.3870332e-05	0.	0.	0.3154596e-15	0.	-0.1763615e-0
		TIME	0.4596272	0.	0.	0.4596272	0.	0.4596272
77	GLOBAL	MAXIMUM	0.5641128e-05	0.	0.	0.3223248e-15	0.	-0.2532098e-0
		TIME	1.225672	0.	0.	0.4596272	0.	1.225672
78	GLOBAL	MAXIMUM	0.	0.	0.	0.3298598e-15	0.	0.7121649e-0
		TIME	0.	0.	0.	0.4596272	0.	1.608695
37	GLOBAL	MAXIMUM	0.	0.	-0.1808331e-11	-0.7902404e-13	0.	0.2026420e-0
		TIME	0.	0.	1.608695	1.608695	0.	1.608695
40	GLOBAL	MAXIMUM	0.	0.	-0.2865948e-29	0.	0.	0.9274559e-0
		TIME	0.	0.	1.608695	0.	0.	0.8426498
41	GLOBAL	MAXIMUM	0.	0.	-0.1507992e-26	-0.6589924e-28	0.	0.2020711e-0
		TIME	0.	0.	1.608695	1.608695	0.	1.608695
43	GLOBAL	MAXIMUM	0.	0.	-0.9052405e-13	-0.3955901e-14	0.	0.7122345e-0
		TIME	0.	0.	0.4596272	0.4596272	0.	1.608695

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	0.4479113e-04	0.4695366e-21	0.1876426e-11	-0.3446193e-22	0.2367303e-04	-0.1560097e-0
		TIME	0.4596272	0.4596272	1.608695	0.4596272	0.4596272	0.4596272
4	GLOBAL	MAXIMUM	0.7263086e-04	0.7224261e-21	0.1879473e-11	0.3437201e-22	-0.2366153e-04	-0.2408485e-0
		TIME	0.4596272	0.4596272	1.608695	0.9958588	0.9958588	0.4596272
6	GLOBAL	MAXIMUM	0.5665706e-04	-0.2183546e-20	0.1884554e-11	0.1407816e-20	0.2639742e-04	-0.1880118e-0
		TIME	1.225672	1.608695	1.608695	1.608695	1.378881	1.225672
7	GLOBAL	MAXIMUM	0.6549392e-04	-0.4945793e-20	0.1887603e-11	0.7419260e-12	0.	-0.2381289e-0
		TIME	0.5362316	1.608695	1.608695	1.608695	0.	0.5362316
8	GLOBAL	MAXIMUM	0.6320841e-04	0.2606148e-20	0.1891675e-11	-0.1373934e-20	-0.7050685e-05	-0.2184461e-0
		TIME	0.5362316	0.6128362	1.608695	1.608695	1.838509	0.5362316
9	GLOBAL	MAXIMUM	-0.6682207e-04	-0.1207062e-21	0.1895746e-11	0.7451266e-12	0.	0.2429988e-0
		TIME	0.9958588	0.9958588	1.608695	1.608695	0.	0.9958588
10	GLOBAL	MAXIMUM	-0.5586293e-04	-0.5866068e-21	0.1900844e-11	-0.1933164e-22	0.1518829e-04	0.1928838e-0
		TIME	0.2298136	0.2298136	1.608695	0.9192543	0.9192543	0.2298136
12	GLOBAL	MAXIMUM	-0.5596760e-04	0.5153859e-20	0.1912071e-11	-0.2775687e-20	-0.1315266e-04	0.1933336e-0
		TIME	0.2298136	1.608695	1.608695	1.608695	0.9192543	0.2298136
13	GLOBAL	MAXIMUM	-0.5814003e-04	0.1002949e-19	0.1918200e-11	0.7539520e-12	0.	0.2120210e-0
		TIME	0.9958588	1.608695	1.608695	1.608695	0.	0.9958588

14	GLOBAL	MAXIMUM	-0.6587972e-04	0.2009474e-19	0.1925367e-11	-0.5623723e-20	-0.6879601e-05	0.2274407e
		TIME	0.9958588	1.608695	1.608695	1.608695	2.144927	0.9958588
15	GLOBAL	MAXIMUM	-0.6677791e-04	0.3027488e-19	0.1932535e-11	0.7595863e-12	0.	0.2428604e
		TIME	0.9958588	1.608695	1.608695	1.608695	0.	0.9958588
16	GLOBAL	MAXIMUM	-0.5603957e-04	0.2731045e-19	0.1940748e-11	0.1701623e-20	0.1753595e-04	0.1922525e
		TIME	0.2298136	1.608695	1.608695	1.608695	0.9958588	0.2298136
18	GLOBAL	MAXIMUM	0.6412496e-04	0.3294780e-19	0.1958423e-11	-0.4728045e-20	0.4427636e-05	-0.2153246e
		TIME	0.4596272	1.608695	1.608695	1.608695	1.838509	0.4596272
20	GLOBAL	MAXIMUM	0.6651328e-04	0.5176234e-19	0.1978411e-11	-0.5873739e-20	0.1547085e-04	-0.2246151e
		TIME	0.4596272	1.608695	1.608695	1.608695	1.302277	0.4596272
21	GLOBAL	MAXIMUM	0.8074203e-04	0.6231543e-19	0.1988938e-11	0.7817556e-12	0.	-0.2930570e
		TIME	1.225672	1.608695	1.608695	1.608695	0.	1.225672
22	GLOBAL	MAXIMUM	0.4180149e-04	0.5197881e-19	0.2000541e-11	0.5632856e-20	-0.2251502e-04	-0.1481025e
		TIME	1.225672	1.608695	1.608695	1.608695	0.5362316	1.225672
23	GLOBAL	MAXIMUM	-0.2131392e-04	0.4203715e-19	0.2012144e-11	0.7908769e-12	-0.1659540e-27	0.8374872e
		TIME	1.608695	1.608695	1.608695	1.608695	1.608695	1.608695
45	GLOBAL	MAXIMUM	0.4480024e-04	-0.1857270e-20	0.8384407e-13	0.3446352e-22	0.2368316e-04	-0.1564371e
		TIME	0.4596272	0.4596272	0.4596272	0.4596272	0.4596272	0.4596272
46	GLOBAL	MAXIMUM	0.8542902e-04	-0.1464467e-21	0.8403998e-13	0.3303207e-13	-0.8107673e-28	-0.3120911e
		TIME	0.4596272	0.4596272	0.4596272	0.4596272	1.608695	0.4596272
47	GLOBAL	MAXIMUM	0.7266101e-04	-0.2865685e-20	0.8432321e-13	-0.3437204e-22	-0.2368587e-04	-0.2416068e
		TIME	0.4596272	0.4596272	0.4596272	0.9958588	0.9958588	0.4596272
48	GLOBAL	MAXIMUM	0.7222632e-04	-0.1223458e-21	0.8460644e-13	0.3325472e-13	-0.8123611e-28	-0.2639015e
		TIME	1.608695	1.608695	0.4596272	0.4596272	1.608695	1.608695
49	GLOBAL	MAXIMUM	0.5668083e-04	-0.2307108e-20	0.8497758e-13	-0.7560040e-22	0.2641943e-04	-0.1884626e
		TIME	1.225672	1.225672	0.4596272	0.3064181	1.378881	1.225672
50	GLOBAL	MAXIMUM	0.6548359e-04	-0.3234601e-21	0.8534871e-13	0.3354647e-13	-0.8147993e-28	-0.2391894e
		TIME	0.5362316	0.4596272	0.4596272	0.4596272	1.608695	0.5362316
51	GLOBAL	MAXIMUM	0.6322317e-04	-0.2679966e-20	0.8580853e-13	0.6516133e-22	-0.7051735e-05	-0.2189981e
		TIME	0.5362316	0.5362316	0.4596272	0.6894407	1.838509	0.5362316
52	GLOBAL	MAXIMUM	-0.6681136e-04	0.1207062e-21	0.8626834e-13	0.3390793e-13	-0.8180840e-28	0.2440278e
		TIME	0.9958588	0.9958588	0.4596272	0.4596272	1.608695	0.9958588
53	GLOBAL	MAXIMUM	-0.5587712e-04	0.2296976e-20	0.8681779e-13	0.1933164e-22	0.1518941e-04	0.1928005e
		TIME	0.2298136	0.2298136	0.4596272	0.9192543	0.9192543	0.2298136
54	GLOBAL	MAXIMUM	0.5596718e-04	-0.1099414e-21	0.8736724e-13	0.3433986e-13	-0.8222185e-28	-0.2047793e
		TIME	0.4596272	0.4596272	0.4596272	0.4596272	1.608695	0.4596272
55	GLOBAL	MAXIMUM	-0.5598168e-04	0.2278518e-20	0.8800747e-13	0.1416319e-21	-0.1315380e-04	0.1932671e
		TIME	0.2298136	0.2298136	0.4596272	0.6894407	0.9192543	0.2298136
56	GLOBAL	MAXIMUM	-0.5812785e-04	-0.4657925e-21	0.8864769e-13	0.3484314e-13	-0.8272068e-28	0.2124259e
		TIME	0.9958588	0.6894407	0.4596272	0.4596272	1.608695	0.9958588
57	GLOBAL	MAXIMUM	-0.6589518e-04	0.2399534e-20	0.8938002e-13	-0.2635315e-21	-0.6879180e-05	0.2281471e
		TIME	0.9958588	0.2298136	0.4596272	0.4596272	2.144927	0.9958588
58	GLOBAL	MAXIMUM	-0.6676587e-04	-0.1388502e-20	0.9011235e-13	0.3541883e-13	-0.8330537e-28	0.2438682e
		TIME	0.9958588	0.6894407	0.4596272	0.4596272	1.608695	0.9958588
59	GLOBAL	MAXIMUM	-0.5605372e-04	0.2181584e-20	0.9093831e-13	-0.1475207e-21	0.1753322e-04	0.1934811e
		TIME	0.2298136	0.2298136	0.4596272	0.6894407	0.9958588	0.2298136
60	GLOBAL	MAXIMUM	0.6239814e-04	-0.8640724e-21	0.9176427e-13	0.3606812e-13	-0.8397650e-28	-0.2282428e
		TIME	0.4596272	1.455486	0.4596272	0.4596272	1.608695	0.4596272
61	GLOBAL	MAXIMUM	0.6414707e-04	0.1977578e-20	0.9268557e-13	-0.2774507e-21	0.4428560e-05	-0.2169903e
		TIME	0.4596272	0.1532090	0.4596272	0.4596272	1.838509	0.4596272
62	GLOBAL	MAXIMUM	0.5620817e-04	0.1833917e-20	0.9360688e-13	0.3679235e-13	-0.8475212e-28	-0.2057378e
		TIME	0.4596272	0.4596272	0.4596272	0.4596272	1.608695	0.4596272
63	GLOBAL	MAXIMUM	0.6653581e-04	0.2615899e-20	0.9462544e-13	0.2958734e-21	0.1546800e-04	-0.2252072e
		TIME	0.4596272	0.1532090	0.4596272	0.6894407	1.302277	0.4596272
64	GLOBAL	MAXIMUM	0.8073085e-04	-0.2888240e-20	0.9564400e-13	0.3759305e-13	-0.8561559e-28	-0.2949605e
		TIME	1.225672	0.6894407	0.4596272	0.4596272	1.608695	1.225672
65	GLOBAL	MAXIMUM	0.4180667e-04	0.3266805e-20	0.9676193e-13	0.2515566e-21	-0.2250234e-04	-0.1484803e
		TIME	1.225672	1.608695	0.4596272	1.608695	0.5362316	1.225672
66	GLOBAL	MAXIMUM	-0.2113166e-04	0.2030445e-20	0.9787987e-13	0.3847186e-13	-0.1426895e-29	0.8305625e

		TIME	1.608695	0.4596272	0.4596272	0.4596272	0.4596272	1.608695
36	GLOBAL	MAXIMUM	-0.2125785e-04	0.3410807e-25	-0.1653446e-08	-0.6519226e-09	0.9779565e-24	0.8390246e-
		TIME	1.608695	1.608695	1.608695	1.608695	1.608695	1.608695
38	GLOBAL	MAXIMUM	-0.7520747e-05	0.9195397e-26	-0.1302183e-28	-0.3946279e-29	-0.2130527e-28	0.2922343e-
		TIME	0.8426498	0.1532090	1.608695	1.608695	1.608695	0.8426498
39	GLOBAL	MAXIMUM	-0.2119797e-04	0.9809821e-23	-0.1378831e-23	-0.5436472e-24	-0.9767109e-24	0.8366609e-
		TIME	1.608695	1.608695	1.608695	1.608695	1.608695	1.608695
42	GLOBAL	MAXIMUM	-0.2113426e-04	0.2180569e-23	-0.1264365e-11	-0.4613805e-12	-0.8242465e-28	0.8306859e-
		TIME	1.608695	1.608695	0.4596272	0.4596272	0.4596272	1.608695

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIO
1	GLOBAL	MAXIMUM	0.2312347e-02	-0.4005858e-20	0.4732846e-09	0.1860254e-09	0.	-0.9003597e-
		TIME	0.3830226	0.4596272	0.3830226	0.3830226	0.	0.3830226
3	GLOBAL	MAXIMUM	-0.1473980e-01	-0.2630257e-19	0.4737969e-09	0.1862268e-09	-0.2290092e-27	0.5309661e-
		TIME	0.4596272	0.4596272	0.3830226	0.3830226	0.3830226	0.4596272
5	GLOBAL	MAXIMUM	-0.1809082e-01	-0.3106071e-19	0.4748222e-09	0.1866297e-09	-0.2295245e-27	0.6518639e-
		TIME	1.608695	1.608695	0.3830226	0.3830226	0.3830226	1.608695
11	GLOBAL	MAXIMUM	-0.1080881e-01	-0.2052671e-19	0.4809893e-09	0.1890537e-09	-0.2325909e-27	0.3892305e-
		TIME	0.4596272	0.4596272	0.3830226	0.3830226	0.3830226	0.4596272
17	GLOBAL	MAXIMUM	-0.1145674e-01	0.6074949e-17	0.4918460e-09	0.1931693e-09	-0.1920109e-27	0.4144857e-
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	0.3830226	0.4596272
19	GLOBAL	MAXIMUM	-0.1036180e-01	0.1037228e-16	0.4966214e-09	0.1951980e-09	-0.2403247e-27	0.3744506e-
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	0.3830226	0.4596272
44	GLOBAL	MAXIMUM	0.2323519e-02	0.4001598e-20	0.5169833e-10	0.2032012e-10	0.2230360e-26	-0.9124010e-
		TIME	0.3830226	0.4596272	0.6128362	0.6128362	0.6128362	0.3830226
24	GLOBAL	MAXIMUM	0.	0.	0.	0.1594991e-11	0.	-0.7865085e-
		TIME	0.	0.	0.	0.3830226	0.	0.3830226
25	GLOBAL	MAXIMUM	-0.1175081e-02	0.	0.	0.1596718e-11	0.	0.4590055e-
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
26	GLOBAL	MAXIMUM	-0.1420720e-02	0.	0.	0.1600173e-11	0.	0.5646442e-
		TIME	1.608695	0.	0.	0.3830226	0.	1.608695
27	GLOBAL	MAXIMUM	0.7167796e-03	0.	0.	0.1605361e-11	0.	-0.2762763e-
		TIME	0.3064181	0.	0.	0.3830226	0.	0.3064181
28	GLOBAL	MAXIMUM	-0.7916139e-03	0.	0.	0.1612286e-11	0.	0.2969003e-
		TIME	1.225672	0.	0.	0.3830226	0.	1.225672
29	GLOBAL	MAXIMUM	-0.8820258e-03	0.	0.	0.1620957e-11	0.	0.3353396e-
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
30	GLOBAL	MAXIMUM	-0.6742069e-03	0.	0.	0.1631382e-11	0.	-0.2553199e-
		TIME	2.757763	0.	0.	0.3830226	0.	1.838509
31	GLOBAL	MAXIMUM	-0.7649496e-03	0.	0.	0.1643574e-11	0.	0.2862221e-
		TIME	1.225672	0.	0.	0.3830226	0.	1.225672
32	GLOBAL	MAXIMUM	-0.8874766e-03	0.	0.	0.1960851e-11	0.	0.4219850e-
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
33	GLOBAL	MAXIMUM	-0.8429142e-03	0.	0.	0.1673638e-11	0.	0.3205280e-
		TIME	0.4596272	0.	0.	0.3830226	0.	0.4596272
34	GLOBAL	MAXIMUM	-0.9770988e-03	0.	0.	0.1691543e-11	0.	0.3752322e-
		TIME	1.225672	0.	0.	0.3830226	0.	1.225672
35	GLOBAL	MAXIMUM	0.	0.	0.	0.1711279e-11	0.	0.1816818e-
		TIME	0.	0.	0.	0.3830226	0.	0.6128362
67	GLOBAL	MAXIMUM	0.	0.	0.	0.1742258e-12	0.	-0.7837699e-
		TIME	0.	0.	0.	0.6128362	0.	0.3830226
68	GLOBAL	MAXIMUM	-0.1162831e-02	0.	0.	0.1750419e-12	0.	0.4579612e-
		TIME	0.4596272	0.	0.	0.6128362	0.	0.4596272
69	GLOBAL	MAXIMUM	-0.1405844e-02	0.	0.	0.1762218e-12	0.	0.5634274e-

		TIME	1.608695	0.	0.	0.6128362	0.	1.608695
70	GLOBAL	MAXIMUM	0.7131729e-03	0.	0.	0.1777678e-12	0.	-0.2758100e
		TIME	0.3064181	0.	0.	0.6128362	0.	0.3064181
71	GLOBAL	MAXIMUM	-0.7864873e-03	0.	0.	0.1796833e-12	0.	0.2962503e
		TIME	1.225672	0.	0.	0.6128362	0.	1.225672
72	GLOBAL	MAXIMUM	-0.8775771e-03	0.	0.	0.1819721e-12	0.	0.3348729e
		TIME	0.4596272	0.	0.	0.6128362	0.	0.4596272
73	GLOBAL	MAXIMUM	-0.6731896e-03	0.	0.	0.1846391e-12	0.	-0.2551385e
		TIME	2.757763	0.	0.	0.6128362	0.	1.838509
74	GLOBAL	MAXIMUM	-0.7619920e-03	0.	0.	0.1876897e-12	0.	0.2858433e
		TIME	1.225672	0.	0.	0.6128362	0.	1.225672
75	GLOBAL	MAXIMUM	-0.9242213e-03	0.	0.	0.1911304e-12	0.	0.3551629e
		TIME	0.4596272	0.	0.	0.6128362	0.	0.4596272
76	GLOBAL	MAXIMUM	-0.8444905e-03	0.	0.	0.1949683e-12	0.	0.3208750e
		TIME	0.4596272	0.	0.	0.6128362	0.	0.4596272
77	GLOBAL	MAXIMUM	-0.9641595e-03	0.	0.	0.1992113e-12	0.	0.3738855e
		TIME	1.225672	0.	0.	0.6128362	0.	1.225672
78	GLOBAL	MAXIMUM	0.	0.	0.	0.2038682e-12	0.	0.1799316e
		TIME	0.	0.	0.	0.6128362	0.	0.6128362
37	GLOBAL	MAXIMUM	0.	0.	-0.4563559e-09	-0.1994275e-10	0.	0.5107618e
		TIME	0.	0.	0.3830226	0.3830226	0.	0.6128362
40	GLOBAL	MAXIMUM	0.	0.	-0.6812709e-27	-0.2977154e-28	0.	-0.2859236e
		TIME	0.	0.	0.3830226	0.3830226	0.	0.3830226
41	GLOBAL	MAXIMUM	0.	0.	-0.3801063e-24	-0.1661065e-25	0.	0.5099312e
		TIME	0.	0.	0.3830226	0.3830226	0.	0.6128362
43	GLOBAL	MAXIMUM	0.	0.	-0.5594795e-10	-0.2444925e-11	0.	0.1798993e
		TIME	0.	0.	0.6128362	0.6128362	0.	0.6128362

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATI
2	GLOBAL	MAXIMUM	-0.7989095e-02	-0.8864764e-19	0.4735408e-09	0.6193531e-20	0.4261885e-02	0.2978115e
		TIME	0.4596272	0.4596272	0.3830226	0.4596272	0.6894407	0.4596272
4	GLOBAL	MAXIMUM	-0.1567969e-01	-0.1522402e-18	0.4743096e-09	-0.5849015e-20	0.4248921e-02	0.5106437e
		TIME	1.608695	1.608695	0.3830226	0.9958588	0.9958588	1.608695
6	GLOBAL	MAXIMUM	-0.1226314e-01	0.6933411e-18	0.4755918e-09	0.3424981e-18	0.4788026e-02	0.4025852e
		TIME	1.225672	0.2298136	0.3830226	0.3830226	1.608695	1.225672
7	GLOBAL	MAXIMUM	0.8896821e-02	-0.1244174e-17	0.4763615e-09	0.1872348e-09	-0.2302926e-27	-0.3208064e
		TIME	0.3064181	0.3830226	0.3830226	0.3830226	0.3830226	0.3064181
8	GLOBAL	MAXIMUM	0.8921941e-02	0.6878529e-18	0.4773889e-09	-0.3457016e-18	0.1273973e-02	-0.3056461e
		TIME	0.3064181	0.2298136	0.3830226	0.3830226	0.9958588	0.3064181
9	GLOBAL	MAXIMUM	-0.9575813e-02	-0.1778144e-19	0.4784164e-09	0.1880425e-09	-0.2313144e-27	0.3442428e
		TIME	1.225672	1.225672	0.3830226	0.3830226	0.3830226	1.225672
10	GLOBAL	MAXIMUM	-0.9665452e-02	-0.9801050e-19	0.4797029e-09	-0.2267654e-20	0.1793257e-02	0.3238924e
		TIME	0.4596272	0.4596272	0.3830226	0.6894407	0.6894407	0.4596272
12	GLOBAL	MAXIMUM	-0.9713193e-02	0.1251300e-17	0.4825361e-09	-0.7038430e-18	-0.1618361e-02	0.3275979e
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	0.6894407	0.4596272
13	GLOBAL	MAXIMUM	0.8234312e-02	0.2529353e-17	0.4840828e-09	0.1902697e-09	-0.2341238e-27	-0.2973504e
		TIME	1.838509	0.3830226	0.3830226	0.3830226	0.3830226	1.838509
14	GLOBAL	MAXIMUM	-0.8939807e-02	0.5091916e-17	0.4858916e-09	-0.1420834e-17	-0.7303589e-03	0.3098667e
		TIME	1.225672	0.3830226	0.3830226	0.3830226	1.838509	1.225672
15	GLOBAL	MAXIMUM	-0.9244246e-02	0.7644350e-17	0.4877004e-09	0.1916916e-09	-0.2359146e-27	0.3327323e
		TIME	1.225672	0.3830226	0.3830226	0.3830226	0.3830226	1.225672
16	GLOBAL	MAXIMUM	-0.9938661e-02	0.6849368e-17	0.4897732e-09	0.4359448e-18	-0.1905812e-02	0.3364142e
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	1.608695	0.4596272
18	GLOBAL	MAXIMUM	-0.1178267e-01	0.8194445e-17	0.4942337e-09	-0.1193703e-17	-0.5813461e-03	0.3944681e

		TIME	0.4596272	0.3830226	0.3830226	0.3830226	1.838509	0.4596272
20	GLOBAL	MAXIMUM	-0.1206083e-01	0.1304033e-16	0.4992779e-09	-0.1489278e-17	-0.1627024e-02	0.3960370e-0
		TIME	0.4596272	0.3830226	0.3830226	0.3830226	1.302277	0.4596272
21	GLOBAL	MAXIMUM	-0.1205590e-01	0.1573368e-16	0.5019345e-09	0.1972863e-09	-0.2429489e-27	0.4332534e-0
		TIME	1.225672	0.3830226	0.3830226	0.3830226	0.3830226	1.225672
22	GLOBAL	MAXIMUM	-0.6728511e-02	0.1315907e-16	0.5048627e-09	0.1422994e-17	0.4684980e-02	0.2200457e-0
		TIME	1.225672	0.3830226	0.3830226	0.3830226	0.4596272	1.225672
23	GLOBAL	MAXIMUM	-0.5364338e-02	0.1061090e-16	0.5077909e-09	0.1995881e-09	-0.4188066e-25	0.2097864e-0
		TIME	0.6128362	0.3830226	0.3830226	0.3830226	0.3830226	0.6128362
45	GLOBAL	MAXIMUM	-0.7988256e-02	0.3534699e-18	0.5181941e-10	-0.6194714e-20	0.4263557e-02	0.2985309e-0
		TIME	0.4596272	0.4596272	0.6128362	0.4596272	0.6894407	0.4596272
46	GLOBAL	MAXIMUM	-0.1474636e-01	0.2630257e-19	0.5194049e-10	0.2041531e-10	-0.2175588e-25	0.5336800e-0
		TIME	0.4596272	0.4596272	0.6128362	0.6128362	0.3830226	0.4596272
47	GLOBAL	MAXIMUM	-0.1568666e-01	0.6074578e-18	0.5211554e-10	0.5849037e-20	0.4254513e-02	0.5131706e-0
		TIME	1.608695	1.608695	0.6128362	0.9958588	0.9958588	1.608695
48	GLOBAL	MAXIMUM	-0.1811590e-01	0.3106071e-19	0.5229059e-10	0.2055291e-10	-0.2180483e-25	0.6564497e-0
		TIME	1.608695	1.608695	0.6128362	0.6128362	0.3830226	1.608695
49	GLOBAL	MAXIMUM	-0.1226819e-01	0.5263680e-18	0.5251997e-10	-0.3355173e-19	0.4795519e-02	0.4035429e-0
		TIME	1.225672	1.225672	0.6128362	0.8426498	1.608695	1.225672
50	GLOBAL	MAXIMUM	0.8895501e-02	0.1436255e-18	0.5274935e-10	0.2073323e-10	-0.2187780e-25	-0.3215353e-0
		TIME	0.3064181	0.8426498	0.6128362	0.6128362	0.3830226	0.3064181
51	GLOBAL	MAXIMUM	0.8924002e-02	-0.3969153e-18	0.5303354e-10	-0.3817662e-19	0.1274345e-02	-0.3059739e-0
		TIME	0.3064181	0.3064181	0.6128362	0.6128362	0.9958588	0.3064181
52	GLOBAL	MAXIMUM	-0.9574533e-02	0.1778144e-19	0.5331772e-10	0.2095663e-10	-0.2197487e-25	0.3453111e-0
		TIME	1.225672	1.225672	0.6128362	0.6128362	0.3830226	1.225672
53	GLOBAL	MAXIMUM	-0.9668513e-02	0.3855354e-18	0.5365731e-10	0.2267654e-20	0.1794481e-02	0.3241148e-0
		TIME	0.4596272	0.4596272	0.6128362	0.6894407	0.6894407	0.4596272
54	GLOBAL	MAXIMUM	-0.1081189e-01	0.2052671e-19	0.5399689e-10	0.2122358e-10	-0.2209614e-25	0.3903740e-0
		TIME	0.4596272	0.4596272	0.6128362	0.6128362	0.3830226	0.4596272
55	GLOBAL	MAXIMUM	-0.9715998e-02	-0.2794561e-18	0.5439258e-10	-0.8141851e-19	-0.1619534e-02	0.3278970e-0
		TIME	0.4596272	1.838509	0.6128362	0.6128362	0.6894407	0.4596272
56	GLOBAL	MAXIMUM	0.8232656e-02	0.2842329e-18	0.5478827e-10	0.2153463e-10	-0.2224176e-25	-0.2975263e-0
		TIME	1.838509	0.6128362	0.6128362	0.6128362	0.3830226	1.838509
57	GLOBAL	MAXIMUM	-0.8941289e-02	0.5657107e-18	0.5524088e-10	-0.1630322e-18	-0.7303280e-03	0.3101528e-0
		TIME	1.225672	0.6128362	0.6128362	0.6128362	1.838509	1.225672
58	GLOBAL	MAXIMUM	-0.9242431e-02	0.8711483e-18	0.5569350e-10	0.2189043e-10	-0.2241188e-25	0.3332682e-0
		TIME	1.225672	0.6128362	0.6128362	0.6128362	0.3830226	1.225672
59	GLOBAL	MAXIMUM	-0.9941518e-02	0.6206533e-18	0.5620398e-10	0.7989270e-19	-0.1907291e-02	0.3358489e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	1.608695	0.4596272
60	GLOBAL	MAXIMUM	-0.1146118e-01	0.5835349e-18	0.5671446e-10	0.2229172e-10	-0.2260671e-25	0.4140839e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	0.3830226	0.4596272
61	GLOBAL	MAXIMUM	-0.1178666e-01	0.6848172e-18	0.5728386e-10	-0.1710236e-18	-0.5813884e-03	0.3941937e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	1.838509	0.4596272
62	GLOBAL	MAXIMUM	-0.1036668e-01	0.1199219e-17	0.5785327e-10	0.2273933e-10	-0.2283084e-25	0.3743034e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	0.3830226	0.4596272
63	GLOBAL	MAXIMUM	-0.1206566e-01	0.1376092e-17	0.5848279e-10	-0.1807474e-18	-0.1626439e-02	0.3973338e-0
		TIME	0.4596272	0.6128362	0.6128362	0.6128362	1.302277	0.4596272
64	GLOBAL	MAXIMUM	-0.1205288e-01	0.1849910e-17	0.5911230e-10	0.2323420e-10	-0.2308014e-25	0.4356200e-0
		TIME	1.225672	0.6128362	0.6128362	0.6128362	0.3830226	1.225672
65	GLOBAL	MAXIMUM	-0.6731363e-02	0.1632914e-17	0.5980324e-10	0.1625570e-18	0.4677210e-02	0.2200772e-0
		TIME	1.225672	0.6128362	0.6128362	0.6128362	0.4596272	1.225672
66	GLOBAL	MAXIMUM	-0.5336449e-02	0.1264704e-17	0.6049417e-10	0.2377735e-10	-0.8818852e-27	0.2096433e-0
		TIME	0.6128362	0.6128362	0.6128362	0.6128362	0.6128362	0.6128362
36	GLOBAL	MAXIMUM	-0.5358071e-02	0.7884221e-23	-0.4172687e-06	-0.1645212e-06	0.2468001e-21	0.2114773e-0
		TIME	0.6128362	0.3830226	0.3830226	0.3830226	0.3830226	0.6128362
38	GLOBAL	MAXIMUM	0.2318557e-02	-0.2571448e-23	-0.3095447e-26	-0.9380786e-27	-0.5376665e-26	-0.9009235e-0
		TIME	0.3830226	0.3830226	0.3830226	0.3830226	0.3830226	0.3830226
39	GLOBAL	MAXIMUM	-0.5349357e-02	0.2475006e-20	-0.3475499e-21	-0.1370324e-21	-0.2464858e-21	0.2111334e-0
		TIME	0.6128362	0.6128362	0.3830226	0.3830226	0.3830226	0.6128362

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 42        GLOBAL    MAXIMUM   -0.5338184e-02   0.5504530e-21  -0.7814348e-09  -0.2851540e-09  -0.5094215e-25   0.2098183e
                      TIME      0.6128362       0.6128362       0.6128362       0.6128362       0.6128362       0.6128362
 (  172) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  172) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  172) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  172) >  $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  172) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:26:48.9         Elapsed time: 1:19:28.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  10 pools of 524288 bytes total 5242880 bytes (3943%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 3, R_Get 70, R_Put 1, R_Del 1
 B_Read 5, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 2.1 CRANE INDUCED VIBRATIONS - BEATING FREQUENCY 1
GREATER AMPLITUDE

```
 **** ACTIVE UNITS -  LENGTH   WEIGHT   ANGLE    TEMPERATURE   TIME
 **** ASSUMED TO BE     INCH    POUND   RADIAN    FAHRENHEIT   SECOND

(    2) > units m n
(    3) > type space frame
(    4) > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

```
(    5) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

```
(    6) > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

```
{    7) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
{    8) > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
{    9) > joints coordinates
{   10) > 36 3.6 3.8 39.6 F
{   11) > 37 3.6 0.0 39.6 S
{   12) > 38 7.2 3.8 0.0 F
{   13) > 39 7.2 3.8 39.6 F
{   14) > 40 7.2 0.0 0.0 S
{   15) > 41 7.2 0.0 39.6 S
{   16) > 42 10.8 3.8 39.6 F
{   17) > 43 10.8 0.0 39.6 S
{   18) > member incidences
{   19) > 'b1' 1 2
{   20) > 'b2' 2 3
{   21) > 'b3' 3 4
{   22) > 'b4' 4 5
{   23) > 'b5' 5 6
{   24) > 'b6' 6 7
{   25) > 'b7' 7 8
{   26) > 'b8' 8 9
{   27) > 'b9' 9 10
{   28) > 'b10' 10 11
{   29) > 'b11' 11 12
{   30) > 'b12' 12 13
{   31) > 'b13' 13 14
{   32) > 'b14' 14 15
{   33) > 'b15' 15 16
{   34) > 'b16' 16 17
{   35) > 'b17' 17 18
{   36) > 'b18' 18 19
{   37) > 'b19' 19 20
{   38) > member incidences
{   39) > 'b20' 20 21
{   40) > 'b21' 21 22
{   41) > 'b22' 22 23
{   42) > 'ba23'  1 38
{   43) > 'ba24' 38 44
{   44) > 'bb25'  2 45
{   45) > 'bb26'  3 46
{   46) > 'bb27'  4 47
{   47) > 'bb28'  5 48
{   48) > 'bb29'  6 49
{   49) > 'bb30'  7 50
{   50) > 'bb31'  8 51
{   51) > 'bb32'  9 52
{   52) > 'bb33' 10 53
{   53) > 'bb34' 11 54
{   54) > 'bb35' 12 55
{   55) > 'bb36' 13 56
{   56) > 'bb37' 14 57
{   57) > 'bb38' 15 58
{   58) > 'bb39' 16 59
{   59) > 'bb40' 17 60
{   60) > 'bb41' 18 61
{   61) > member incidences
{   62) > 'bb42' 19 62
{   63) > 'bb43' 20 63
{   64) > 'bb44' 21 64
{   65) > 'bb45' 22 65
{   66) > 'bc46' 23 36
{   67) > 'bc47' 36 39
{   68) > 'bc48' 39 42
{   69) > 'bc49' 42 66
{   70) > 'bd50' 44 45
{   71) > 'bd51' 45 46
{   72) > 'bd52' 46 47
{   73) > 'bd53' 47 48
{   74) > 'bd54' 48 49
{   75) > 'bd55' 49 50
{   76) > 'bd56' 50 51
```

```
(   77) > 'bd57' 51 52
(   78) > 'bd58' 52 53
(   79) > 'bd59' 53 54
(   80) > 'bd60' 54 55
(   81) > 'bd61' 55 56
(   82) > 'bd62' 56 57
(   83) > 'bd63' 57 58
(   84) > 'bd64' 58 59
(   85) > 'bd65' 59 60
(   86) > 'bd66' 60 61
(   87) > 'bd67' 61 62
(   88) > 'bd68' 62 63
(   89) > 'bd69' 63 64
(   90) > 'bd70' 64 65
(   91) > member incidences
(   92) > 'bd71' 65 66
(   93) > 's72'  24  1
(   94) > 's73'  25  3
(   95) > 's74'  26  5
(   96) > 's75'  27  7
(   97) > 's76'  28  9
(   98) > 's77'  29 11
(   99) > 's78'  30 13
(  100) > 's79'  31 15
(  101) > 's80'  32 17
(  102) > 's81'  33 19
(  103) > 's82'  34 21
(  104) > 's83'  35 23
(  105) > 's84'  37 36
(  106) > 's85'  40 38
(  107) > 's86'  41 39
(  108) > 's87'  43 42
(  109) > 's88'  67 44
(  110) > 's89'  68 46
(  111) > 's90'  69 48
(  112) > 's91'  70 50
(  113) > 's92'  71 52
(  114) > 's93'  72 54
(  115) > 's94'  73 56
(  116) > 's95'  74 58
(  117) > 's96'  75 60
(  118) > 's97'  76 62
(  119) > 's98'  77 64
(  120) > 's99'  78 66
(  121) >
(  121) > joint releases
(  122) > 25 to 34 kfx 1.15E7
(  123) > 68 to 77 kfx 1.15E7
(  124) > 40 37 41 43 kfz 1.15E7
(  125) > 1 for y for z mom x mom y mom z kfx  3.2574E6
(  126) > 3 for y for z mom x mom y mom z kfx 7.0822E5
(  127) > 5 for y for z mom x mom y mom z kfx 2.1247E6
(  128) > 11 for y for z mom x mom y mom z kfx 7.0822E5
(  129) > 17 for y for z mom x mom y mom z kfx 7.0822E5
(  130) > 19 for y for z mom x mom y mom z kfx 1.11225E6
(  131) > 44 for x for y mom x mom y mom z kfz 1.11225E6
(  132) > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
(  133) > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
(  134) >
(  134) > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
(  135) >
(  135) > member releases
(  136) > 'bb25' to 'bb45' start           moment x y z end moment y z
(  137) > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
(  138) > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
(  139) > 'ba23' 'ba24' start mom x y z end mom z y
(  140) > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
(  141) > member eccentricities
(  142) > 'bb25' to 'bb45' start x 0.15
(  143) > member properties prismatic
(  144) > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
(  145) > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
(  146) > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
(  147) > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
(  148) > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
(  149) > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  150) > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  151) > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
(  152) > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
(  153) > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
(  154) > material constants
(  155) > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
(  156) > material concrete 's85' 's80' 'bb25' to 'bb45'
(  157) > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
(  158) > material steel 'bd50' to 'bd71'
(  159) > constants beta 0.0 all
(  160) > dead load 'dl' direction -y all members
(  161) > damping percents 2.5 50
```

```
(  162) > inertia of joints lumped
(  163) > dynamic degrees of freedom with static condensation
(  164) > generate  70 from joints translations x

(  165) >   dynamic loading 2.1
(  166) >    support acceleration
(  167) >   transl x function  sin ampl 0.0855 freq 500.328575   phase 0.0
(  168) >    integrate from 0.0 to  30.00 at 0.07660454
(  169) >     end of dynamic loading
(  170) >     dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS   72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                      19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS    16.383
                                              ----------
                                               35.690
                                              ==========



 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                       2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS     1.021
                                              ----------
                                                3.572
                                              ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.47 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.54 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES    1.85 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.40 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.30 SECONDS
 TIME TO PROCESS   78 JOINTS                      4.11 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.20 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.60 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        9.75 SECONDS
 TIME FOR CONDENSATION                          235.86 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.38 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.13 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.60 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.15 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.21 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.10 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        93.85 SECONDS

 *************************
 * EIGEN-SOLUTION CHECKS *
 *************************


 MODE------EIGENVALUE-------FREQUENCY-------FREQUENCY--------PERIOD--------ESTIMATED---/
         ((RAD/SEC)**2)      (RAD/SEC)        (CYC/SEC)        (SEC/CYC)       ACCURACY

    1     6.727454d+01    8.202106d+00    1.305406d+00    7.660454d-01    1.682314d-10
    2     6.954759d+01    8.339520d+00    1.327276d+00    7.534229d-01    1.715818d-10
    3     7.757453d+01    8.807640d+00    1.401780d+00    7.133790d-01    5.332525d-11
    4     8.785211d+01    9.372946d+00    1.491751d+00    6.703533d-01    1.053954d-10
    5     9.546691d+01    9.770717d+00    1.555058d+00    6.430629d-01    9.126849d-11
    6     1.111998d+02    1.054513d+01    1.678310d+00    5.958377d-01    4.898725d-11
    7     1.195056d+02    1.093186d+01    1.739860d+00    5.747590d-01    4.387047d-11
    8     1.396344d+02    1.181670d+01    1.880686d+00    5.317208d-01    4.177525d-11
    9     1.677455d+02    1.295166d+01    2.061321d+00    4.851258d-01    1.219794d-12
   10     2.066677d+02    1.437594d+01    2.288002d+00    4.370625d-01    3.011305d-11
   11     4.878849d+02    2.208812d+01    3.515433d+00    2.844600d-01    2.553983d-11
   12     8.257434d+02    2.873575d+01    4.573437d+00    2.186539d-01    1.439964d-12
   13     1.399263d+03    3.740672d+01    5.953465d+00    1.679694d-01    1.660736d-12
   14     1.500251d+03    3.873308d+01    6.164561d+00    1.622176d-01    7.436474d-12
   15     1.649781d+03    4.061750d+01    6.464476d+00    1.546916d-01    7.459423d-12
   16     1.838761d+03    4.288077d+01    6.824687d+00    1.465269d-01    1.807695d-12
   17     2.046501d+03    4.523827d+01    7.199894d+00    1.388909d-01    4.440182d-13
   18     2.254418d+03    4.748071d+01    7.556789d+00    1.323313d-01    2.205616d-12
   19     2.446104d+03    4.945810d+01    7.871501d+00    1.270406d-01    3.810084d-12
   20     2.586623d+03    5.085885d+01    8.094437d+00    1.235416d-01    2.089889d-12
   21     2.674139d+03    5.171207d+01    8.230232d+00    1.215033d-01    2.045214d-12
   22     3.563408d+03    5.969429d+01    9.500641d+00    1.052561d-01    3.623298d-13
   23     4.780143d+03    6.913858d+01    1.100375d+01    9.087814d-02    1.458916d-12
   24     2.609301d+04    1.615333d+02    2.570882d+01    3.889715d-02    2.697309d-13
   25     2.806204d+04    1.675173d+02    2.666120d+01    3.750769d-02    2.082313d-13
```

26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 48.55 SECONDS
TIME TO COMPUTE TIME HISTORY RESPONSE 1554.43 SECONDS

(171) > list dynamic max dis max acc times all joints all
1

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - test1 TITLE - NONE GIVEN

ACTIVE UNITS M N RAD DEGF SEC

LOADING - 12

MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATI
1	GLOBAL	MAXIMUM	0.2597096e-03	0.9832196e-21	0.2209062e-09	0.8682757e-10	0.	-0.1065985e
		TIME	1.378882	1.378882	4.826086	4.826086	0.	1.378882
3	GLOBAL	MAXIMUM	0.3652870e-02	0.6205988e-20	0.2211453e-09	0.8692157e-10	-0.1047083e-27	-0.1322690e
		TIME	1.378882	1.378882	4.826086	4.826086	4.826086	1.378882
5	GLOBAL	MAXIMUM	0.2680944e-02	0.1058473e-19	0.2216238e-09	0.8710966e-10	-0.1049342e-27	-0.1006183e
		TIME	29.79917	29.87577	4.826086	4.826086	4.826086	29.79917
11	GLOBAL	MAXIMUM	0.1401464e-01	0.3797237e-19	0.2245023e-09	0.8824106e-10	-0.1062937e-27	-0.5166876e
		TIME	29.87577	29.87577	4.826086	4.826086	4.826086	29.87577
17	GLOBAL	MAXIMUM	0.6330500e-02	0.2831004e-17	0.2295697e-09	0.9016202e-10	-0.8769890e-28	-0.2303469e
		TIME	29.87577	4.826086	4.826086	4.826086	4.826086	29.87577
19	GLOBAL	MAXIMUM	-0.4361501e-02	0.4833172e-17	0.2317987e-09	0.9110889e-10	-0.1097414e-27	0.1602583e
		TIME	5.592131	4.826086	4.826086	4.826086	4.826086	5.592131
44	GLOBAL	MAXIMUM	0.2600857e-03	-0.9824083e-21	0.7967837e-12	0.3131773e-12	0.3437470e-28	-0.1026860e
		TIME	1.378882	1.378882	0.2298136	0.2298136	0.2298136	1.378882
24	GLOBAL	MAXIMUM	0.	0.	0.	0.7444642e-12	0.	-0.8368155e
		TIME	0.	0.	0.	4.826086	0.	1.378882
25	GLOBAL	MAXIMUM	0.2691615e-03	0.	0.	0.7452701e-12	0.	-0.1146517e
		TIME	1.378882	0.	0.	4.826086	0.	1.378882
26	GLOBAL	MAXIMUM	0.1812363e-03	0.	0.	0.7468828e-12	0.	-0.8222922e
		TIME	29.79917	0.	0.	4.826086	0.	29.79917
27	GLOBAL	MAXIMUM	0.1780983e-02	0.	0.	0.7493041e-12	0.	-0.7722465e
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
28	GLOBAL	MAXIMUM	0.2127743e-02	0.	0.	0.7525365e-12	0.	-0.9227409e
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
29	GLOBAL	MAXIMUM	0.9816193e-03	0.	0.	0.7565835e-12	0.	-0.4354598e
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
30	GLOBAL	MAXIMUM	0.2289147e-02	0.	0.	0.7614496e-12	0.	-0.9929654e
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
31	GLOBAL	MAXIMUM	0.2062084e-02	0.	0.	0.7671400e-12	0.	-0.8943574e
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
32	GLOBAL	MAXIMUM	0.5174968e-03	0.	0.	0.9152298e-12	0.	-0.2296930e
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
33	GLOBAL	MAXIMUM	-0.3103035e-03	0.	0.	0.7811724e-12	0.	0.1356557e
		TIME	5.592131	0.	0.	4.826086	0.	5.592131
34	GLOBAL	MAXIMUM	-0.9952705e-03	0.	0.	0.7895297e-12	0.	0.4275455e
		TIME	4.826086	0.	0.	4.826086	0.	4.826086
35	GLOBAL	MAXIMUM	0.	0.	0.	0.7987417e-12	0.	0.5609810e

		TIME	0.	0.	0.	4.826086	0.	4.826086
67	GLOBAL	MAXIMUM	0.	0.	0.	0.2685199e-14	0.	-0.8726001e-0
		TIME	0.	0.	0.	0.2298136	0.	1.378882
68	GLOBAL	MAXIMUM	0.2656552e-03	0.	0.	0.2697777e-14	0.	-0.1142509e-0
		TIME	1.378882	0.	0.	0.2298136	0.	1.378882
69	GLOBAL	MAXIMUM	0.1930677e-03	0.	0.	0.2715961e-14	0.	-0.8372461e-0
		TIME	29.79917	0.	0.	0.2298136	0.	29.79917
70	GLOBAL	MAXIMUM	0.1769164e-02	0.	0.	0.2739788e-14	0.	-0.7707000e-0
		TIME	29.87577	0.	0.	0.2298136	0.	29.87577
71	GLOBAL	MAXIMUM	0.2113990e-02	0.	0.	0.2769310e-14	0.	-0.9209373e-0
		TIME	29.87577	0.	0.	0.2298136	0.	29.87577
72	GLOBAL	MAXIMUM	0.1003543e-02	0.	0.	0.2804586e-14	0.	-0.4381748e-0
		TIME	29.87577	0.	0.	0.2298136	0.	29.87577
73	GLOBAL	MAXIMUM	0.2274965e-02	0.	0.	0.2845689e-14	0.	-0.9910987e-0
		TIME	29.87577	0.	0.	0.2298136	0.	29.87577
74	GLOBAL	MAXIMUM	0.2048986e-02	0.	0.	0.2892707e-14	0.	-0.8926371e-0
		TIME	29.87577	0.	0.	0.2298136	0.	29.87577
75	GLOBAL	MAXIMUM	0.4531530e-03	0.	0.	0.2945735e-14	0.	-0.1979128e-0
		TIME	29.87577	0.	0.	0.2298136	0.	29.87577
76	GLOBAL	MAXIMUM	-0.3154827e-03	0.	0.	0.3004885e-14	0.	0.1363292e-0
		TIME	5.592131	0.	0.	0.2298136	0.	5.592131
77	GLOBAL	MAXIMUM	-0.9811811e-03	0.	0.	0.3070279e-14	0.	0.4257831e-0
		TIME	4.826086	0.	0.	0.2298136	0.	4.826086
78	GLOBAL	MAXIMUM	0.	0.	0.	0.3142053e-14	0.	0.5664216e-0
		TIME	0.	0.	0.	0.2298136	0.	4.826086
37	GLOBAL	MAXIMUM	0.	0.	-0.2130047e-09	-0.9308304e-11	0.	0.1618433e-0
		TIME	0.	0.	4.826086	4.826086	0.	4.826086
40	GLOBAL	MAXIMUM	0.	0.	-0.3247046e-27	-0.1418959e-28	0.	-0.3199649e-0
		TIME	0.	0.	4.826086	4.826086	0.	1.378882
41	GLOBAL	MAXIMUM	0.	0.	-0.1774879e-24	-0.7756223e-26	0.	0.1612210e-0
		TIME	0.	0.	4.826086	4.826086	0.	4.826086
43	GLOBAL	MAXIMUM	0.	0.	-0.8622795e-12	-0.3768161e-13	0.	0.5677901e-0
		TIME	0.	0.	0.2298136	0.2298136	0.	4.826086

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			/----------TRANS----------/			/----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	0.2145087e-02	0.2124250e-19	0.2210257e-09	-0.1450769e-20	0.9425446e-03	-0.7146444e-0
		TIME	1.378882	1.378882	4.826086	1.378882	1.378882	1.378882
4	GLOBAL	MAXIMUM	0.2838877e-02	0.2864520e-19	0.2213846e-09	-0.2405897e-20	-0.6404485e-03	-0.9508715e-0
		TIME	1.378882	1.378882	4.826086	29.87577	1.302277	1.378882
6	GLOBAL	MAXIMUM	0.1427549e-01	-0.3505291e-18	0.2219831e-09	0.1633358e-18	0.6149256e-02	-0.4952859e-0
		TIME	29.87577	4.136645	4.826086	4.826086	29.87577	29.87577
7	GLOBAL	MAXIMUM	0.2463724e-01	-0.5924730e-18	0.2223423e-09	0.8739205e-10	-0.1052734e-27	-0.8960402e-0
		TIME	29.87577	4.826086	4.826086	4.826086	4.826086	29.87577
8	GLOBAL	MAXIMUM	0.2844056e-01	0.4363630e-18	0.2228219e-09	-0.1612104e-18	0.1334120e-02	-0.9834238e-0
		TIME	29.87577	25.20289	4.826086	4.826086	29.87577	29.87577
9	GLOBAL	MAXIMUM	0.2944007e-01	0.5624418e-19	0.2233015e-09	0.8776905e-10	-0.1057264e-27	-0.1070807e-0
		TIME	29.87577	29.87577	4.826086	4.826086	4.826086	29.87577
10	GLOBAL	MAXIMUM	0.2285351e-01	0.2422771e-18	0.2239019e-09	0.5075504e-20	-0.4284840e-02	-0.7937475e-0
		TIME	29.87577	29.87577	4.826086	29.87577	29.87577	29.87577
12	GLOBAL	MAXIMUM	0.2402944e-01	-0.5469358e-18	0.2252243e-09	-0.3272764e-18	0.4907944e-02	-0.8346193e-0
		TIME	29.87577	4.443063	4.826086	4.826086	29.87577	29.87577
13	GLOBAL	MAXIMUM	0.3168324e-01	0.1170591e-17	0.2259463e-09	0.8880859e-10	-0.1069759e-27	-0.1152551e-0
		TIME	29.87577	4.826086	4.826086	4.826086	4.826086	29.87577
14	GLOBAL	MAXIMUM	0.3166276e-01	0.2317482e-17	0.2267905e-09	-0.6629607e-18	-0.8938231e-03	-0.1095260e-0

		TIME	29.87577	4.826086	4.826086	4.826086	29.95237	29.87577
15	GLOBAL	MAXIMUM	0.2853554e-01	0.3557248e-17	0.2276348e-09	0.8947227e-10	-0.1077738e-27	-0.1037969e
		TIME	29.87577	4.826086	4.826086	4.826086	4.826086	29.87577
16	GLOBAL	MAXIMUM	0.1833690e-01	0.3155829e-17	0.2286022e-09	0.2017344e-18	-0.6168065e-02	-0.6341581e
		TIME	29.87577	4.826086	4.826086	4.826086	29.87577	29.87577
18	GLOBAL	MAXIMUM	0.5110385e-02	0.3799202e-17	0.2306842e-09	-0.5561583e-18	-0.1211225e-02	-0.1760050e
		TIME	29.79917	4.826086	4.826086	4.826086	29.95237	29.79917
20	GLOBAL	MAXIMUM	-0.9461824e-02	0.5997030e-17	0.2330386e-09	-0.6910947e-18	0.2611338e-02	0.3244723e
		TIME	4.826086	4.826086	4.826086	4.826086	4.443063	4.826086
21	GLOBAL	MAXIMUM	-0.1361052e-01	0.7321111e-17	0.2342785e-09	0.9208361e-10	-0.1109134e-27	0.4930146e
		TIME	4.826086	4.826086	4.826086	4.826086	4.826086	4.826086
22	GLOBAL	MAXIMUM	-0.8126686e-02	0.6065816e-17	0.2356453e-09	0.6589265e-18	0.3307254e-02	0.2807919e
		TIME	4.826086	4.826086	4.826086	4.826086	4.826086	4.826086
23	GLOBAL	MAXIMUM	-0.1704397e-02	0.4948976e-17	0.2370120e-09	0.9315801e-10	-0.1954785e-25	0.6856893e
		TIME	4.826086	4.826086	4.826086	4.826086	4.826086	4.826086
45	GLOBAL	MAXIMUM	0.2145947e-02	-0.8483408e-19	0.7986498e-12	0.1450994e-20	0.9427458e-03	-0.7168641e
		TIME	1.378882	1.378882	0.2298136	1.378882	1.378882	1.378882
46	GLOBAL	MAXIMUM	0.3653971e-02	-0.6205988e-20	0.8005160e-12	0.3146443e-12	-0.9947293e-26	-0.1331042e
		TIME	1.378882	1.378882	0.2298136	0.2298136	4.826086	1.378882
47	GLOBAL	MAXIMUM	0.2839903e-02	-0.1131806e-18	0.8032138e-12	0.2405903e-20	-0.6404074e-03	-0.9529473e
		TIME	1.378882	1.378882	0.2298136	29.87577	1.302277	1.378882
48	GLOBAL	MAXIMUM	0.2683513e-02	-0.1058473e-19	0.8059117e-12	0.3167651e-12	-0.9968745e-26	-0.9812804e
		TIME	29.79917	29.87577	0.2298136	0.2298136	4.826086	29.79917
49	GLOBAL	MAXIMUM	0.1427869e-01	-0.5898776e-18	0.8094470e-12	0.1015925e-19	0.6147270e-02	-0.4950153e
		TIME	29.87577	29.87577	0.2298136	29.87577	29.87577	29.87577
50	GLOBAL	MAXIMUM	0.2463233e-01	-0.4715803e-19	0.8129822e-12	0.3195442e-12	-0.1000097e-25	-0.8984049e
		TIME	29.87577	29.87577	0.2298136	0.2298136	4.826086	29.87577
51	GLOBAL	MAXIMUM	0.2844690e-01	-0.1169083e-17	0.8173621e-12	0.2523666e-20	0.1333848e-02	-0.9859774e
		TIME	29.87577	29.87577	0.2298136	29.87577	29.87577	29.87577
52	GLOBAL	MAXIMUM	0.2943418e-01	-0.5624418e-19	0.8217421e-12	0.3229872e-12	-0.1004401e-25	-0.1073550e
		TIME	29.87577	29.87577	0.2298136	0.2298136	4.826086	29.87577
53	GLOBAL	MAXIMUM	0.2285861e-01	-0.9455437e-18	0.8269758e-12	-0.5075504e-20	-0.4282567e-02	-0.7927469e
		TIME	29.87577	29.87577	0.2298136	29.87577	29.87577	29.87577
54	GLOBAL	MAXIMUM	0.1401694e-01	-0.3797237e-19	0.8322096e-12	0.3271015e-12	-0.1009790e-25	-0.5119440e
		TIME	29.87577	29.87577	0.2298136	0.2298136	4.826086	29.87577
55	GLOBAL	MAXIMUM	0.2403479e-01	-0.9939637e-18	0.8383080e-12	-0.6221402e-20	0.4905537e-02	-0.8336538e
		TIME	29.87577	29.87577	0.2298136	29.49275	29.87577	29.87577
56	GLOBAL	MAXIMUM	0.3167686e-01	-0.6036760e-19	0.8444064e-12	0.3318955e-12	-0.1016271e-25	-0.1155364e
		TIME	29.87577	29.87577	0.2298136	0.2298136	4.826086	29.87577
57	GLOBAL	MAXIMUM	0.3166978e-01	-0.1301183e-17	0.8513821e-12	-0.2774253e-20	-0.8936465e-03	-0.1097969e
		TIME	29.87577	29.87577	0.2298136	28.42028	29.95237	29.87577
58	GLOBAL	MAXIMUM	0.2852982e-01	0.5340788e-19	0.8583579e-12	0.3373791e-12	-0.1023851e-25	-0.1040575e
		TIME	29.87577	29.49275	0.2298136	0.2298136	4.826086	29.87577
59	GLOBAL	MAXIMUM	0.1834099e-01	-0.7559346e-18	0.8662255e-12	-0.1009082e-19	-0.6166060e-02	-0.6359439e
		TIME	29.87577	29.87577	0.2298136	29.87577	29.87577	29.87577
60	GLOBAL	MAXIMUM	0.6331997e-02	0.1903861e-19	0.8740931e-12	0.3435639e-12	-0.1032537e-25	-0.2313125e
		TIME	29.87577	28.65010	0.2298136	0.2298136	4.826086	29.87577
61	GLOBAL	MAXIMUM	0.5111696e-02	-0.2165115e-18	0.8828689e-12	-0.4592775e-20	-0.1211522e-02	-0.1761327e
		TIME	29.79917	29.79917	0.2298136	28.42028	29.95237	29.79917
62	GLOBAL	MAXIMUM	-0.4363460e-02	0.2050784e-19	0.8916447e-12	0.3504626e-12	-0.1042544e-25	0.1592119e
		TIME	5.592131	3.293995	0.2298136	0.2298136	4.826086	5.592131
63	GLOBAL	MAXIMUM	-0.9464256e-02	0.3962324e-18	0.9013469e-12	-0.4528585e-20	0.2610201e-02	0.3254175e
		TIME	4.826086	4.826086	0.2298136	4.826086	4.443063	4.826086
64	GLOBAL	MAXIMUM	-0.1360825e-01	-0.3591065e-19	0.9110491e-12	0.3580895e-12	-0.1053677e-25	0.4960214e
		TIME	4.826086	5.209108	0.2298136	0.2298136	4.826086	4.826086
65	GLOBAL	MAXIMUM	-0.8128765e-02	0.3427522e-18	0.9216979e-12	0.6404763e-20	0.3312069e-02	0.2812019e
		TIME	4.826086	4.826086	0.2298136	4.826086	4.826086	4.826086
66	GLOBAL	MAXIMUM	-0.1684801e-02	0.1980222e-19	0.9323468e-12	0.3664606e-12	-0.1359177e-28	0.6638193e
		TIME	4.826086	0.2298136	0.2298136	0.2298136	0.2298136	4.826086

36	GLOBAL	MAXIMUM	-0.1697793e-02	0.3717819e-23	-0.1947607e-06	-0.7679048e-07	0.1151943e-21	0.6701005e-0
		TIME	4.826086	4.826086	4.826086	4.826086	4.826086	4.826086
38	GLOBAL	MAXIMUM	0.2594598e-03	-0.4184060e-24	-0.1475340e-26	-0.4471032e-27	-0.2509565e-26	-0.1008185e-0
		TIME	1.378882	1.378882	4.826086	4.826086	4.826086	1.378882
39	GLOBAL	MAXIMUM	-0.1691265e-02	0.7828163e-21	-0.1622860e-21	-0.6398631e-22	-0.1150475e-21	0.6675241e-0
		TIME	4.826086	4.826086	4.826086	4.826086	4.826086	4.826086
42	GLOBAL	MAXIMUM	-0.1684813e-02	0.1742176e-21	-0.1204361e-10	-0.4394843e-11	-0.7851293e-27	0.6622190e-0
		TIME	4.826086	4.826086	0.2298136	0.2298136	0.2298136	4.826086

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
1	GLOBAL	MAXIMUM	-0.2136970e-01	0.7980782e-19	-0.1619065e-07	-0.6363766e-08	0.	0.8759019e-0
		TIME	1.378882	0.9958590	4.826086	4.826086	0.	1.378882
3	GLOBAL	MAXIMUM	0.2968083	-0.4942407e-18	-0.1620818e-07	-0.6370655e-08	0.7689826e-26	-0.1075949
		TIME	0.9958590	1.378882	4.826086	4.826086	4.826086	0.9958590
5	GLOBAL	MAXIMUM	-0.1786428	-0.7095073e-18	-0.1624325e-07	-0.6384441e-08	0.7706481e-26	0.6689285e-0
		TIME	29.79917	29.87577	4.826086	4.826086	4.826086	29.79917
11	GLOBAL	MAXIMUM	-0.9428994	-0.2552059e-17	-0.1645422e-07	-0.6467363e-08	0.7806637e-26	0.3471576
		TIME	29.87577	29.87577	4.826086	4.826086	4.826086	29.87577
17	GLOBAL	MAXIMUM	-0.4259389	-0.2075617e-15	-0.1682562e-07	-0.6608154e-08	0.6441321e-26	0.1553239
		TIME	29.87577	4.826086	4.826086	4.826086	4.826086	29.87577
19	GLOBAL	MAXIMUM	0.3087885	-0.3542930e-15	-0.1698899e-07	-0.6677552e-08	0.8060481e-26	-0.1133690
		TIME	3.370600	4.826086	4.826086	4.826086	4.826086	3.370600
44	GLOBAL	MAXIMUM	-0.2139469e-01	-0.7974643e-19	-0.4555887e-09	-0.1790700e-09	-0.1965493e-25	0.8445740e-0
		TIME	1.378882	0.9958590	23.13457	23.13457	23.13457	1.378882
24	GLOBAL	MAXIMUM	0.	0.	0.	-0.5456327e-10	0.	0.6895971e-0
		TIME	0.	0.	0.	4.826086	0.	1.378882
25	GLOBAL	MAXIMUM	0.2137531e-01	0.	0.	-0.5462233e-10	0.	-0.9338712e-0
		TIME	0.9958590	0.	0.	4.826086	0.	0.9958590
26	GLOBAL	MAXIMUM	-0.1250552e-01	0.	0.	-0.5474053e-10	0.	0.5463551e-0
		TIME	27.50103	0.	0.	4.826086	0.	29.79917
27	GLOBAL	MAXIMUM	-0.1210090	0.	0.	-0.5491799e-10	0.	0.5191445e-0
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
28	GLOBAL	MAXIMUM	-0.1443386	0.	0.	-0.5515490e-10	0.	0.6203955e-0
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
29	GLOBAL	MAXIMUM	-0.6723242e-01	0.	0.	-0.5545152e-10	0.	0.2925748e-0
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
30	GLOBAL	MAXIMUM	-0.1551993	0.	0.	-0.5580816e-10	0.	0.6676491e-0
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
31	GLOBAL	MAXIMUM	-0.1399289	0.	0.	-0.5622522e-10	0.	0.6012996e-0
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
32	GLOBAL	MAXIMUM	-0.3394467e-01	0.	0.	-0.6707902e-10	0.	0.1548996e-0
		TIME	29.87577	0.	0.	4.826086	0.	29.87577
33	GLOBAL	MAXIMUM	0.2231030e-01	0.	0.	-0.5725369e-10	0.	-0.9589145e-0
		TIME	3.370600	0.	0.	4.826086	0.	3.370600
34	GLOBAL	MAXIMUM	-0.6931380e-01	0.	0.	-0.5786621e-10	0.	0.2999823e-0
		TIME	4.443063	0.	0.	4.826086	0.	4.443063
35	GLOBAL	MAXIMUM	0.	0.	0.	-0.5854137e-10	0.	-0.3795447e-0
		TIME	0.	0.	0.	4.826086	0.	4.826086
67	GLOBAL	MAXIMUM	0.	0.	0.	-0.1535355e-11	0.	0.7179065e-0
		TIME	0.	0.	0.	23.13457	0.	1.378882
68	GLOBAL	MAXIMUM	0.2105273e-01	0.	0.	-0.1542547e-11	0.	-0.9301869e-0
		TIME	0.9958590	0.	0.	23.13457	0.	0.9958590
69	GLOBAL	MAXIMUM	-0.1330123e-01	0.	0.	-0.1552945e-11	0.	0.5564023e-0
		TIME	29.79917	0.	0.	23.13457	0.	29.79917

70	GLOBAL	MAXIMUM	-0.1202139	0.	0.	-0.1566569e-11	0.	0.5181045e
		TIME	29.87577	0.	0.	23.13457	0.	29.87577
71	GLOBAL	MAXIMUM	-0.1434134	0.	0.	-0.1583449e-11	0.	0.6191824e
		TIME	29.87577	0.	0.	23.13457	0.	29.87577
72	GLOBAL	MAXIMUM	-0.6870734e-01	0.	0.	-0.1603619e-11	0.	0.2944015e
		TIME	29.87577	0.	0.	23.13457	0.	29.87577
73	GLOBAL	MAXIMUM	-0.1542452	0.	0.	-0.1627121e-11	0.	0.6663933e
		TIME	29.87577	0.	0.	23.13457	0.	29.87577
74	GLOBAL	MAXIMUM	-0.1390412	0.	0.	-0.1654005e-11	0.	0.6001472e
		TIME	29.87577	0.	0.	23.13457	0.	29.87577
75	GLOBAL	MAXIMUM	-0.3167852e-01	0.	0.	-0.1684326e-11	0.	0.1327631e
		TIME	29.87577	0.	0.	23.13457	0.	29.87577
76	GLOBAL	MAXIMUM	0.2268815e-01	0.	0.	-0.1718147e-11	0.	-0.9639567e
		TIME	3.370600	0.	0.	23.13457	0.	3.370600
77	GLOBAL	MAXIMUM	-0.6830741e-01	0.	0.	-0.1755538e-11	0.	0.2987253e
		TIME	4.443063	0.	0.	23.13457	0.	4.443063
78	GLOBAL	MAXIMUM	0.	0.	0.	-0.1796577e-11	0.	-0.3832420e
		TIME	0.	0.	0.	23.13457	0.	4.826086
37	GLOBAL	MAXIMUM	0.	0.	0.1561154e-07	0.6822242e-09	0.	-0.1095643e
		TIME	0.	0.	4.826086	4.826086	0.	4.826086
40	GLOBAL	MAXIMUM	0.	0.	0.2375038e-25	0.1037891e-26	0.	0.2631609e
		TIME	0.	0.	4.826086	4.826086	0.	1.378882
41	GLOBAL	MAXIMUM	0.	0.	0.1300793e-22	0.5684464e-24	0.	-0.1091144e
		TIME	0.	0.	4.826086	4.826086	0.	4.826086
43	GLOBAL	MAXIMUM	0.	0.	0.4930382e-09	0.2154577e-10	0.	-0.3842008e
		TIME	0.	0.	23.13457	23.13457	0.	4.826086

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATI
2	GLOBAL	MAXIMUM	0.1757621	0.1712293e-17	-0.1619942e-07	0.1154771e-18	0.7713450e-01	-0.5774112e
		TIME	0.9958590	0.9958590	4.826086	1.378882	0.9958590	0.9958590
4	GLOBAL	MAXIMUM	-0.2236923	-0.2248708e-17	-0.1622572e-07	0.1617661e-18	-0.6112509e-01	0.7502162e
		TIME	1.378882	1.378882	4.826086	29.10972	0.9958590	1.378882
6	GLOBAL	MAXIMUM	-0.9604489	0.2516274e-16	-0.1626958e-07	-0.1194986e-16	-0.4136945	0.3327533
		TIME	29.87577	4.136645	4.826086	4.826086	29.87577	29.87577
7	GLOBAL	MAXIMUM	-1.657523	0.4329236e-16	-0.1629591e-07	-0.6405138e-08	0.7731481e-26	0.6023628
		TIME	29.87577	4.826086	4.826086	4.826086	4.826086	29.87577
8	GLOBAL	MAXIMUM	-1.913416	0.3006392e-16	-0.1633106e-07	0.1181794e-16	-0.8975815e-01	0.6611535
		TIME	29.87577	28.65010	4.826086	4.826086	29.87577	29.87577
9	GLOBAL	MAXIMUM	-1.980652	-0.3781293e-17	-0.1636621e-07	-0.6432769e-08	0.7764854e-26	0.7199442
		TIME	29.87577	29.87577	4.826086	4.826086	4.826086	29.87577
10	GLOBAL	MAXIMUM	-1.537551	-0.1628577e-16	-0.1641022e-07	-0.3414537e-18	0.2882647	0.5335509
		TIME	29.87577	29.87577	4.826086	29.87577	29.87577	29.87577
12	GLOBAL	MAXIMUM	-1.616678	-0.4062864e-16	-0.1650714e-07	0.2399721e-16	-0.3301929	0.5610532
		TIME	29.87577	4.826086	4.826086	4.826086	29.87577	29.87577
13	GLOBAL	MAXIMUM	-2.131593	-0.8593189e-16	-0.1656005e-07	-0.6508959e-08	0.7856874e-26	0.7749490
		TIME	29.87577	4.826086	4.826086	4.826086	4.826086	29.87577
14	GLOBAL	MAXIMUM	-2.130219	-0.1706119e-15	-0.1662193e-07	0.4858946e-16	0.6014121e-01	0.7364029
		TIME	29.87577	4.826086	4.826086	4.826086	29.95237	29.87577
15	GLOBAL	MAXIMUM	-1.919812	-0.2608538e-15	-0.1668381e-07	-0.6557601e-08	0.7915619e-26	0.6978569
		TIME	29.87577	4.826086	4.826086	4.826086	4.826086	29.87577
16	GLOBAL	MAXIMUM	-1.233695	-0.2318666e-15	-0.1675472e-07	-0.1480337e-16	0.4149648	0.4265906
		TIME	29.87577	4.826086	4.826086	4.826086	29.87577	29.87577
18	GLOBAL	MAXIMUM	-0.3421664	-0.2787833e-15	-0.1690730e-07	0.4075871e-16	-0.8149555e-01	0.1177871
		TIME	29.79917	4.826086	4.826086	4.826086	28.80331	29.79917

20	GLOBAL	MAXIMUM	0.6559811	-0.4399200e-15	-0.1707986e-07	0.5065726e-16	-0.1879790	-0.2250099
		TIME	4.826086	4.826086	4.826086	4.826086	4.443063	4.826086
21	GLOBAL	MAXIMUM	-0.9543629	-0.5366589e-15	-0.1717074e-07	-0.6748991e-08	0.8146754e-26	0.3458510
		TIME	4.443063	4.826086	4.826086	4.826086	4.826086	4.443063
22	GLOBAL	MAXIMUM	-0.5683893	-0.4448723e-15	-0.1727091e-07	-0.4831206e-16	0.2333791	0.1959257
		TIME	4.443063	4.826086	4.826086	4.826086	4.443063	4.443063
23	GLOBAL	MAXIMUM	0.1154208	-0.3627355e-15	-0.1737108e-07	-0.6827736e-08	0.1432701e-23	-0.4647547e-0
		TIME	4.826086	4.826086	4.826086	4.826086	4.826086	4.826086
45	GLOBAL	MAXIMUM	0.1758432	-0.6853345e-17	-0.4566557e-09	-0.1154956e-18	0.7715816e-01	-0.5795512e-0
		TIME	0.9958590	0.9958590	23.13457	1.378882	0.9958590	0.9958590
46	GLOBAL	MAXIMUM	0.2968982	0.4942407e-18	-0.4577227e-09	-0.1799088e-09	0.7305335e-24	-0.1083540
		TIME	0.9958590	1.378882	23.13457	23.13457	4.826086	0.9958590
47	GLOBAL	MAXIMUM	-0.2237737	0.8925040e-17	-0.4592653e-09	-0.1617665e-18	-0.6112853e-01	0.7526148e-0
		TIME	1.378882	1.378882	23.13457	29.10972	0.9958590	1.378882
48	GLOBAL	MAXIMUM	-0.1788118	0.7095073e-18	-0.4608080e-09	-0.1811214e-09	0.7321157e-24	0.6521613e-0
		TIME	29.79917	29.87577	23.13457	23.13457	4.826086	29.79917
49	GLOBAL	MAXIMUM	-0.9606644	0.4005828e-16	-0.4628293e-09	-0.9211466e-18	-0.4135609	0.3325717
		TIME	29.87577	29.87577	23.13457	29.87577	29.87577	29.87577
50	GLOBAL	MAXIMUM	-1.657194	0.4025636e-17	-0.4648507e-09	-0.1827104e-09	0.7344907e-24	0.6039541
		TIME	29.87577	29.87577	23.13457	23.13457	4.826086	29.87577
51	GLOBAL	MAXIMUM	-1.913843	0.7902495e-16	-0.4673551e-09	-0.3745040e-18	-0.8973975e-01	0.6628719
		TIME	29.87577	29.87577	23.13457	14.47826	29.87577	29.87577
52	GLOBAL	MAXIMUM	-1.980257	0.3781293e-17	-0.4698595e-09	-0.1846791e-09	0.7376612e-24	0.7217896
		TIME	29.87577	29.87577	23.13457	23.13457	4.826086	29.87577
53	GLOBAL	MAXIMUM	-1.537894	0.6355878e-16	-0.4728521e-09	0.3414537e-18	0.2881119	0.5328780
		TIME	29.87577	29.87577	23.13457	29.87577	29.87577	29.87577
54	GLOBAL	MAXIMUM	-0.9430542	0.2552059e-17	-0.4758446e-09	-0.1870316e-09	0.7416305e-24	0.3439665
		TIME	29.87577	29.87577	23.13457	23.13457	4.826086	29.87577
55	GLOBAL	MAXIMUM	-1.617038	-0.6595977e-16	-0.4793316e-09	-0.8280749e-18	-0.3300310	0.5604038
		TIME	29.87577	24.13043	23.13457	14.47826	29.87577	29.87577
56	GLOBAL	MAXIMUM	-2.131165	-0.5033051e-17	-0.4828186e-09	-0.1897727e-09	0.7464030e-24	0.7768414
		TIME	29.87577	11.87370	23.13457	23.13457	4.826086	29.87577
57	GLOBAL	MAXIMUM	-2.130692	-0.8616731e-16	-0.4868072e-09	0.1504634e-17	0.6012941e-01	0.7382256
		TIME	29.87577	18.76811	23.13457	23.13457	29.95237	29.87577
58	GLOBAL	MAXIMUM	-1.919428	0.8690095e-17	-0.4907959e-09	-0.1929082e-09	0.7519838e-24	0.6996098
		TIME	29.87577	14.47826	23.13457	23.13457	4.826086	29.87577
59	GLOBAL	MAXIMUM	-1.233971	0.5097228e-16	-0.4952944e-09	0.1000075e-17	0.4148294	0.4273897
		TIME	29.87577	15.32091	23.13457	14.47826	29.87577	29.87577
60	GLOBAL	MAXIMUM	-0.4260421	0.5507171e-17	-0.4997930e-09	-0.1964446e-09	0.7583790e-24	0.1551691
		TIME	29.87577	18.99792	23.13457	23.13457	4.826086	29.87577
61	GLOBAL	MAXIMUM	-0.3422550	0.2014590e-16	-0.5048109e-09	0.1659520e-17	-0.8151598e-01	0.1176945
		TIME	29.79917	14.47826	23.13457	23.13457	28.80331	29.79917
62	GLOBAL	MAXIMUM	0.3089234	-0.1103306e-16	-0.5098287e-09	-0.2003891e-09	0.7657457e-24	-0.1125841
		TIME	3.370600	23.13457	23.13457	23.13457	4.826086	3.370600
63	GLOBAL	MAXIMUM	0.6561510	-0.3302630e-16	-0.5153763e-09	0.1709403e-17	-0.1879014	-0.2256834
		TIME	4.826086	17.08281	23.13457	23.13457	4.443063	4.826086
64	GLOBAL	MAXIMUM	-0.9542019	-0.1718691e-16	-0.5209239e-09	-0.2047501e-09	0.7739416e-24	0.3479970
		TIME	4.443063	23.13457	23.13457	23.13457	4.826086	4.443063
65	GLOBAL	MAXIMUM	-0.5685406	-0.2978813e-16	-0.5270127e-09	-0.1639157e-17	0.2337251	0.1962217
		TIME	4.443063	17.08281	23.13457	23.13457	4.443063	4.443063
66	GLOBAL	MAXIMUM	0.1140048	-0.1128590e-16	-0.5331016e-09	-0.2095365e-09	0.7771565e-26	-0.4492267e-0
		TIME	4.826086	23.13457	23.13457	23.13457	23.13457	4.826086
36	GLOBAL	MAXIMUM	0.1149368	-0.2687641e-21	0.1427440e-04	0.5628127e-05	-0.8442818e-20	-0.4536430e-0
		TIME	4.826086	4.826086	4.826086	4.826086	4.826086	4.826086
38	GLOBAL	MAXIMUM	-0.2133973e-01	0.3444444e-22	0.1079131e-24	0.3270317e-25	0.1839310e-24	0.8291999e-0
		TIME	1.378882	1.378882	4.826086	4.826086	4.826086	1.378882
39	GLOBAL	MAXIMUM	0.1144649	-0.5298356e-19	0.1189379e-19	0.4689497e-20	0.8432064e-20	-0.4517805e-0
		TIME	4.826086	4.826086	4.826086	4.826086	4.826086	4.826086

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 42        GLOBAL    MAXIMUM    0.1140046      -0.1178966e-19   0.6886351e-08   0.2512903e-08   0.4489249e-24  -0.4480971e-
                      TIME       4.826086        4.826086        23.13457        23.13457        23.13457        4.826086
 (  172) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  172) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  172) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  172) > $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  172) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:36:54.5          Elapsed time: 1:41:52.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  14 pools of 524288 bytes total 7340032 bytes (5521%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 2, R_Get 70, R_Put 1, R_Del 1
 B_Read 4, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 2.1 CRANE INDUCED VIBRATIONS - BEATING FREQUENCY 2
SMALLER AMPLITUDE

**** ACTIVE UNITS - LENGTH WEIGHT ANGLE TEMPERATURE TIME
**** ASSUMED TO BE INCH POUND RADIAN FAHRENHEIT SECOND

```
(    2) > units m n
(    3) > type space frame
(    4) > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

```
(    5) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

```
(    6) > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

```
(    7) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
(    8) > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
(    9) > joints coordinates
(   10) > 36 3.6 3.8 39.6 F
(   11) > 37 3.6 0.0 39.6 S
(   12) > 38 7.2 3.8 0.0 F
(   13) > 39 7.2 3.8 39.6 F
(   14) > 40 7.2 0.0 0.0 S
(   15) > 41 7.2 0.0 39.6 S
(   16) > 42 10.8 3.8 39.6 F
(   17) > 43 10.8 0.0 39.6 S
(   18) > member incidences
(   19) > 'b1' 1 2
(   20) > 'b2' 2 3
(   21) > 'b3' 3 4
(   22) > 'b4' 4 5
(   23) > 'b5' 5 6
(   24) > 'b6' 6 7
(   25) > 'b7' 7 8
(   26) > 'b8' 8 9
(   27) > 'b9' 9 10
(   28) > 'b10' 10 11
(   29) > 'b11' 11 12
(   30) > 'b12' 12 13
(   31) > 'b13' 13 14
(   32) > 'b14' 14 15
(   33) > 'b15' 15 16
(   34) > 'b16' 16 17
(   35) > 'b17' 17 18
(   36) > 'b18' 18 19
(   37) > 'b19' 19 20
(   38) > member incidences
(   39) > 'b20' 20 21
(   40) > 'b21' 21 22
(   41) > 'b22' 22 23
(   42) > 'ba23'  1 38
(   43) > 'ba24' 38 44
(   44) > 'bb25'  2 45
(   45) > 'bb26'  3 46
(   46) > 'bb27'  4 47
(   47) > 'bb28'  5 48
(   48) > 'bb29'  6 49
(   49) > 'bb30'  7 50
(   50) > 'bb31'  8 51
(   51) > 'bb32'  9 52
(   52) > 'bb33' 10 53
(   53) > 'bb34' 11 54
(   54) > 'bb35' 12 55
(   55) > 'bb36' 13 56
(   56) > 'bb37' 14 57
(   57) > 'bb38' 15 58
(   58) > 'bb39' 16 59
(   59) > 'bb40' 17 60
(   60) > 'bb41' 18 61
(   61) > member incidences
(   62) > 'bb42' 19 62
(   63) > 'bb43' 20 63
(   64) > 'bb44' 21 64
(   65) > 'bb45' 22 65
(   66) > 'bc46' 23 36
(   67) > 'bc47' 36 39
(   68) > 'bc48' 39 42
(   69) > 'bc49' 42 66
(   70) > 'bd50' 44 45
(   71) > 'bd51' 45 46
(   72) > 'bd52' 46 47
(   73) > 'bd53' 47 48
(   74) > 'bd54' 48 49
(   75) > 'bd55' 49 50
(   76) > 'bd56' 50 51
```

```
(   77) > 'bd57' 51 52
(   78) > 'bd58' 52 53
(   79) > 'bd59' 53 54
(   80) > 'bd60' 54 55
(   81) > 'bd61' 55 56
(   82) > 'bd62' 56 57
(   83) > 'bd63' 57 58
(   84) > 'bd64' 58 59
(   85) > 'bd65' 59 60
(   86) > 'bd66' 60 61
(   87) > 'bd67' 61 62
(   88) > 'bd68' 62 63
(   89) > 'bd69' 63 64
(   90) > 'bd70' 64 65
(   91) > member incidences
(   92) > 'bd71' 65 66
(   93) > 's72'  24  1
(   94) > 's73'  25  3
(   95) > 's74'  26  5
(   96) > 's75'  27  7
(   97) > 's76'  28  9
(   98) > 's77'  29 11
(   99) > 's78'  30 13
(  100) > 's79'  31 15
(  101) > 's80'  32 17
(  102) > 's81'  33 19
(  103) > 's82'  34 21
(  104) > 's83'  35 23
(  105) > 's84'  37 36
(  106) > 's85'  40 38
(  107) > 's86'  41 39
(  108) > 's87'  43 42
(  109) > 's88'  67 44
(  110) > 's89'  68 46
(  111) > 's90'  69 48
(  112) > 's91'  70 50
(  113) > 's92'  71 52
(  114) > 's93'  72 54
(  115) > 's94'  73 56
(  116) > 's95'  74 58
(  117) > 's96'  75 60
(  118) > 's97'  76 62
(  119) > 's98'  77 64
(  120) > 's99'  78 66
(  121) >
(  121) > joint releases
(  122) > 25 to 34 kfx 1.15E7
(  123) > 68 to 77 kfx 1.15E7
(  124) > 40 37 41 43 kfz 1.15E7
(  125) > 1 for y for z mom x mom y mom z kfx  3.2574E6
(  126) > 3 for y for z mom x mom y mom z kfx 7.0822E5
(  127) > 5 for y for z mom x mom y mom z kfx 2.1247E6
(  128) > 11 for y for z mom x mom y mom z kfx 7.0822E5
(  129) > 17 for y for z mom x mom y mom z kfx 7.0822E5
(  130) > 19 for y for z mom x mom y mom z kfx 1.11225E6
(  131) > 44 for x for y mom x mom y mom z kfz 1.11225E6
(  132) > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
(  133) > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
(  134) >
(  134) > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
(  135) >
(  135) > member releases
(  136) > 'bb25' to 'bb45' start          moment x y z end moment y z
(  137) > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
(  138) > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
(  139) > 'ba23' 'ba24' start mom x y z end mom z y
(  140) > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
(  141) > member eccentricities
(  142) > 'bb25' to 'bb45' start x 0.15
(  143) > member properties prismatic
(  144) > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
(  145) > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
(  146) > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
(  147) > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
(  148) > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
(  149) > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  150) > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  151) > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
(  152) > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
(  153) > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
(  154) > material constants
(  155) > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
(  156) > material concrete 's85' 's80' 'bb25' to 'bb45'
(  157) > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
(  158) > material steel 'bd50' to 'bd71'
(  159) > constants beta 0.0 all
(  160) > dead load 'dl' direction -y all members
(  161) > damping percents 2.5 50
```

```
(  162) > inertia of joints lumped
(  163) > dynamic degrees of freedom with static condensation
(  164) > generate  70 from joints translations x

(  165) >   dynamic loading 2.1
(  166) >    support acceleration
(  167) >   transl x function  sin ampl 0.0505 freq 492.1264679   phase 0.0
(  168) >    integrate from 0.0 to  30.00 at 0.07660454
(  169) >     end of dynamic loading
(  170) >     dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS   72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                        19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS      16.383
                                                ----------
                                                 35.690
                                                ==========



 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                         2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS       1.021
                                                ----------
                                                  3.572
                                                ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.43 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.38 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES    1.85 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.41 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.11 SECONDS
 TIME TO PROCESS   78 JOINTS                      4.06 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.36 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.63 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX       10.06 SECONDS
 TIME FOR CONDENSATION                          235.35 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.35 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.16 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.61 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.16 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.18 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.13 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        94.08 SECONDS

 *************************
 * EIGEN-SOLUTION CHECKS *
 *************************


 MODE------EIGENVALUE-------FREQUENCY-------FREQUENCY--------PERIOD--------ESTIMATED---/
         ((RAD/SEC)**2)      (RAD/SEC)        (CYC/SEC)        (SEC/CYC)       ACCURACY

    1     6.727454d+01    8.202106d+00    1.305406d+00    7.660454d-01    1.682314d-10
    2     6.954759d+01    8.339520d+00    1.327276d+00    7.534229d-01    1.715818d-10
    3     7.757453d+01    8.807640d+00    1.401780d+00    7.133790d-01    5.332525d-11
    4     8.785211d+01    9.372946d+00    1.491751d+00    6.703533d-01    1.053954d-10
    5     9.546691d+01    9.770717d+00    1.555058d+00    6.430629d-01    9.126849d-11
    6     1.111998d+02    1.054513d+01    1.678310d+00    5.958377d-01    4.898725d-11
    7     1.195056d+02    1.093186d+01    1.739860d+00    5.747590d-01    4.387047d-11
    8     1.396344d+02    1.181670d+01    1.880686d+00    5.317208d-01    4.177525d-11
    9     1.677455d+02    1.295166d+01    2.061321d+00    4.851258d-01    1.219794d-12
   10     2.066677d+02    1.437594d+01    2.288002d+00    4.370625d-01    3.011305d-11
   11     4.878849d+02    2.208812d+01    3.515433d+00    2.844600d-01    2.553983d-11
   12     8.257434d+02    2.873575d+01    4.573437d+00    2.186539d-01    1.439964d-12
   13     1.399263d+03    3.740672d+01    5.953465d+00    1.679694d-01    1.660736d-12
   14     1.500251d+03    3.873308d+01    6.164561d+00    1.622176d-01    7.436474d-12
   15     1.649781d+03    4.061750d+01    6.464476d+00    1.546916d-01    7.459423d-12
   16     1.838761d+03    4.288077d+01    6.824687d+00    1.465269d-01    1.807695d-12
   17     2.046501d+03    4.523827d+01    7.199894d+00    1.388909d-01    4.440182d-13
   18     2.254418d+03    4.748071d+01    7.556789d+00    1.323313d-01    2.205616d-12
   19     2.446104d+03    4.945810d+01    7.871501d+00    1.270406d-01    3.810084d-12
   20     2.586623d+03    5.085885d+01    8.094437d+00    1.235416d-01    2.089889d-12
   21     2.674139d+03    5.171207d+01    8.230232d+00    1.215033d-01    2.045214d-12
   22     3.563408d+03    5.969429d+01    9.500641d+00    1.052561d-01    3.623298d-13
   23     4.780143d+03    6.913858d+01    1.100375d+01    9.087814d-02    1.458916d-12
   24     2.609301d+04    1.615333d+02    2.570882d+01    3.889715d-02    2.697309d-13
   25     2.806204d+04    1.675173d+02    2.666120d+01    3.750769d-02    2.082313d-13
```

26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 48.61 SECONDS
TIME TO COMPUTE TIME HISTORY RESPONSE 1554.23 SECONDS

(171) > list dynamic max dis max acc times all joints all
1

*****
RESULTS OF LATEST ANALYSES
*****

PROBLEM - test1 TITLE - NONE GIVEN

ACTIVE UNITS M N RAD DEGF SEC

LOADING - 12

MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIO
1	GLOBAL	MAXIMUM	-0.3175411e-06	-0.7630702e-24	0.7276776e-13	0.2860150e-13	0.	0.1274911e-
		TIME	29.33954	29.95237	25.66252	25.66252	0.	29.33954
3	GLOBAL	MAXIMUM	-0.2810340e-05	-0.4831138e-23	0.7284653e-13	0.2863246e-13	0.	0.1016553e-
		TIME	29.95237	28.03726	25.66252	25.66252	0.	29.95237
5	GLOBAL	MAXIMUM	-0.1751438e-05	-0.4101854e-23	0.7300417e-13	0.2869442e-13	0.	0.6391901e-
		TIME	29.26293	29.26293	25.66252	25.66252	0.	29.26293
11	GLOBAL	MAXIMUM	-0.2297226e-05	-0.5171463e-23	0.7395236e-13	0.2906711e-13	0.	0.8380587e-
		TIME	29.18633	29.18633	25.66252	25.66252	0.	29.18633
17	GLOBAL	MAXIMUM	-0.2181476e-05	0.9309752e-21	0.7562158e-13	0.2969989e-13	0.	0.7836870e-
		TIME	28.11386	25.66252	25.66252	25.66252	0.	28.11386
19	GLOBAL	MAXIMUM	-0.1994114e-05	0.1591354e-20	0.7635581e-13	0.3001179e-13	0.	0.7272172e-
		TIME	28.11386	25.66252	25.66252	25.66252	0.	28.11386
44	GLOBAL	MAXIMUM	-0.3182647e-06	0.7623005e-24	0.1692697e-14	0.6653176e-15	0.	0.1253663e-
		TIME	29.33954	29.95237	27.88405	27.88405	0.	29.33954
24	GLOBAL	MAXIMUM	0.	0.	0.	0.2452308e-15	0.	0.1047337e-
		TIME	0.	0.	0.	25.66252	0.	29.33954
25	GLOBAL	MAXIMUM	-0.2096339e-06	0.	0.	0.2454963e-15	0.	0.8812613e-
		TIME	29.95237	0.	0.	25.66252	0.	29.95237
26	GLOBAL	MAXIMUM	-0.1310524e-06	0.	0.	0.2460275e-15	0.	0.5441268e-
		TIME	29.26293	0.	0.	25.66252	0.	29.26293
27	GLOBAL	MAXIMUM	-0.2579217e-06	0.	0.	0.2468251e-15	0.	0.1092060e-
		TIME	28.19047	0.	0.	25.66252	0.	28.19047
28	GLOBAL	MAXIMUM	-0.2341843e-06	0.	0.	0.2478898e-15	0.	0.9918102e-
		TIME	28.26707	0.	0.	25.66252	0.	28.26707
29	GLOBAL	MAXIMUM	-0.1699895e-06	0.	0.	0.2492229e-15	0.	0.7152355e-
		TIME	29.18633	0.	0.	25.66252	0.	29.18633
30	GLOBAL	MAXIMUM	-0.2325806e-06	0.	0.	0.2508259e-15	0.	0.9814477e-
		TIME	29.26293	0.	0.	25.66252	0.	29.26293
31	GLOBAL	MAXIMUM	-0.2485174e-06	0.	0.	0.2527003e-15	0.	0.1052859e-
		TIME	28.26707	0.	0.	25.66252	0.	28.26707
32	GLOBAL	MAXIMUM	-0.1880487e-06	0.	0.	0.3014819e-15	0.	0.7939379e-
		TIME	28.11386	0.	0.	25.66252	0.	28.11386
33	GLOBAL	MAXIMUM	-0.1476974e-06	0.	0.	0.2573227e-15	0.	0.6209932e-
		TIME	28.11386	0.	0.	25.66252	0.	28.11386
34	GLOBAL	MAXIMUM	-0.2646284e-06	0.	0.	0.2600756e-15	0.	0.1122406e-
		TIME	25.66252	0.	0.	25.66252	0.	25.66252
35	GLOBAL	MAXIMUM	0.	0.	0.	0.2631101e-15	0.	0.2166120e-

		TIME	0.	0.	0.	25.66252	0.	25.66252
67	GLOBAL	MAXIMUM	0.	0.	0.	0.5704469e-17	0.	0.1070256e-0
		TIME	0.	0.	0.	27.88405	0.	29.33954
68	GLOBAL	MAXIMUM	-0.2069085e-06	0.	0.	0.5731189e-17	0.	0.8781391e-0
		TIME	29.95237	0.	0.	27.88405	0.	29.95237
69	GLOBAL	MAXIMUM	-0.1323277e-06	0.	0.	0.5769820e-17	0.	0.5461657e-0
		TIME	29.26293	0.	0.	27.88405	0.	29.26293
70	GLOBAL	MAXIMUM	-0.2559128e-06	0.	0.	0.5820440e-17	0.	0.1089469e-0
		TIME	28.19047	0.	0.	27.88405	0.	28.19047
71	GLOBAL	MAXIMUM	-0.2332721e-06	0.	0.	0.5883155e-17	0.	0.9905506e-0
		TIME	28.26707	0.	0.	27.88405	0.	28.26707
72	GLOBAL	MAXIMUM	-0.1709853e-06	0.	0.	0.5958095e-17	0.	0.7165821e-0
		TIME	29.18633	0.	0.	27.88405	0.	29.18633
73	GLOBAL	MAXIMUM	-0.2316298e-06	0.	0.	0.6045417e-17	0.	0.9801436e-0
		TIME	29.26293	0.	0.	27.88405	0.	29.26293
74	GLOBAL	MAXIMUM	-0.2472013e-06	0.	0.	0.6145301e-17	0.	0.1051102e-0
		TIME	28.26707	0.	0.	27.88405	0.	28.26707
75	GLOBAL	MAXIMUM	-0.1619174e-06	0.	0.	0.6257955e-17	0.	0.6807779e-0
		TIME	28.11386	0.	0.	27.88405	0.	28.11386
76	GLOBAL	MAXIMUM	-0.1484947e-06	0.	0.	0.6383613e-17	0.	0.6221994e-0
		TIME	28.11386	0.	0.	27.88405	0.	28.11386
77	GLOBAL	MAXIMUM	-0.2615699e-06	0.	0.	0.6522537e-17	0.	0.1118520e-0
		TIME	25.66252	0.	0.	27.88405	0.	25.66252
78	GLOBAL	MAXIMUM	0.	0.	0.	0.6675015e-17	0.	0.2173053e-0
		TIME	0.	0.	0.	27.88405	0.	25.66252
37	GLOBAL	MAXIMUM	0.	0.	-0.7016497e-13	-0.3066209e-14	0.	0.6199014e-1
		TIME	0.	0.	25.66252	25.66252	0.	25.66252
40	GLOBAL	MAXIMUM	0.	0.	-0.1085661e-30	0.	0.	0.3916008e-0
		TIME	0.	0.	25.66252	0.	0.	29.33954
41	GLOBAL	MAXIMUM	0.	0.	-0.5848296e-28	-0.2555705e-29	0.	0.6177945e-1
		TIME	0.	0.	25.66252	25.66252	0.	25.66252
43	GLOBAL	MAXIMUM	0.	0.	-0.1831837e-14	-0.8005127e-16	0.	0.2176521e-0
		TIME	0.	0.	27.88405	27.88405	0.	25.66252

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	-0.1708006e-05	-0.1663962e-22	0.7280714e-13	0.1132543e-23	-0.7071332e-06	0.5619785e-0
		TIME	29.95237	29.95237	25.66252	28.03726	29.95237	29.95237
4	GLOBAL	MAXIMUM	-0.2366517e-05	-0.2387824e-22	0.7292535e-13	-0.4972548e-24	0.4769238e-06	0.7917255e-0
		TIME	28.03726	28.03726	25.66252	28.65010	29.95237	28.03726
6	GLOBAL	MAXIMUM	-0.2444557e-05	-0.1182286e-21	0.7312250e-13	0.5405621e-22	-0.7052860e-06	0.8306948e-0
		TIME	29.33954	25.66252	25.66252	25.66252	28.19047	29.33954
7	GLOBAL	MAXIMUM	-0.3488358e-05	-0.1972864e-21	0.7324083e-13	0.2878744e-13	0.	0.1265743e-0
		TIME	28.19047	25.66252	25.66252	25.66252	0.	28.19047
8	GLOBAL	MAXIMUM	-0.3429551e-05	-0.1292525e-21	0.7339880e-13	-0.5320831e-22	0.1500495e-06	0.1187317e-0
		TIME	28.19047	28.26707	25.66252	25.66252	24.28364	28.19047
9	GLOBAL	MAXIMUM	-0.3172765e-05	-0.6276953e-23	0.7355678e-13	0.2891163e-13	0.	0.1153256e-0
		TIME	28.26707	28.26707	25.66252	25.66252	0.	28.26707
10	GLOBAL	MAXIMUM	-0.2785994e-05	-0.2921533e-22	0.7375457e-13	-0.5541504e-24	0.4162225e-06	0.9610395e-0
		TIME	29.18633	29.18633	25.66252	28.26707	28.34368	29.18633
12	GLOBAL	MAXIMUM	-0.2832414e-05	0.1687085e-21	0.7419018e-13	-0.1077009e-21	-0.3783803e-06	0.9767261e-0
		TIME	29.18633	25.66252	25.66252	25.66252	28.26707	29.18633
13	GLOBAL	MAXIMUM	-0.3140209e-05	0.3832902e-21	0.7442800e-13	0.2925406e-13	0.	0.1141010e-0
		TIME	29.26293	25.66252	25.66252	25.66252	0.	29.26293
14	GLOBAL	MAXIMUM	-0.3367697e-05	0.7499611e-21	0.7470610e-13	-0.2183002e-21	0.1222976e-06	0.1167793e-0

		TIME	28.26707	25.66252	25.66252	25.66252	29.18633	28.26707
15	GLOBAL	MAXIMUM	-0.3366198e-05	0.1169170e-20	0.7498420e-13	0.2947268e-13	0.	0.1222839e
		TIME	28.26707	25.66252	25.66252	25.66252	0.	28.26707
16	GLOBAL	MAXIMUM	-0.2854281e-05	0.1027849e-20	0.7530289e-13	0.6616535e-22	0.4534717e-06	0.9777694e
		TIME	28.19047	25.66252	25.66252	25.66252	26.96480	28.19047
18	GLOBAL	MAXIMUM	-0.2243759e-05	0.1244630e-20	0.7598870e-13	-0.1834387e-21	0.1468325e-06	0.7554521e
		TIME	28.11386	25.66252	25.66252	25.66252	21.52588	28.11386
20	GLOBAL	MAXIMUM	-0.2890092e-05	0.1977650e-20	0.7676425e-13	-0.2282036e-21	-0.5708927e-06	0.9917573e
		TIME	25.66252	25.66252	25.66252	25.66252	28.26707	25.66252
21	GLOBAL	MAXIMUM	-0.3579726e-05	0.2412886e-20	0.7717269e-13	0.3033287e-13	0.	0.1296885e
		TIME	25.66252	25.66252	25.66252	25.66252	0.	25.66252
22	GLOBAL	MAXIMUM	-0.2274398e-05	0.2002484e-20	0.7762290e-13	0.2173503e-21	0.8131254e-06	0.7785971e
		TIME	25.66252	25.66252	25.66252	25.66252	25.66252	25.66252
23	GLOBAL	MAXIMUM	-0.6524737e-06	0.1630425e-20	0.7807312e-13	0.3068678e-13	-0.6439174e-29	0.2603081e
		TIME	25.66252	25.66252	25.66252	25.66252	25.66252	25.66252
45	GLOBAL	MAXIMUM	-0.1708783e-05	0.6665270e-22	0.1696661e-14	-0.1132753e-23	-0.7072300e-06	0.5637960e
		TIME	29.95237	29.95237	27.88405	28.03726	29.95237	29.95237
46	GLOBAL	MAXIMUM	-0.2811171e-05	0.4831138e-23	0.1700626e-14	0.6684341e-15	-0.3227144e-29	0.1023034e
		TIME	29.95237	28.03726	27.88405	27.88405	25.66252	29.95237
47	GLOBAL	MAXIMUM	-0.2367373e-05	0.9425344e-22	0.1706357e-14	0.4972484e-24	0.4768266e-06	0.7933215e
		TIME	28.03726	28.03726	27.88405	28.65010	29.95237	28.03726
48	GLOBAL	MAXIMUM	-0.1753565e-05	0.4101854e-23	0.1712089e-14	0.6729396e-15	-0.3233877e-29	0.6374642e
		TIME	29.26293	29.26293	27.88405	27.88405	25.66252	29.26293
49	GLOBAL	MAXIMUM	-0.2445297e-05	0.9711232e-22	0.1719599e-14	0.9860824e-24	-0.7048186e-06	0.8303656e
		TIME	29.33954	29.33954	27.88405	27.88405	28.19047	29.33954
50	GLOBAL	MAXIMUM	-0.3487691e-05	0.3915530e-23	0.1727109e-14	0.6788435e-15	-0.3244055e-29	0.1269851e
		TIME	28.19047	27.65424	27.88405	27.88405	25.66252	28.19047
51	GLOBAL	MAXIMUM	-0.3430281e-05	0.1394325e-21	0.1736414e-14	-0.1438751e-23	0.1500572e-06	0.1189699e
		TIME	28.19047	28.19047	27.88405	27.88405	24.28364	28.19047
52	GLOBAL	MAXIMUM	-0.3172101e-05	0.6276953e-23	0.1745719e-14	0.6861580e-15	-0.3257690e-29	0.1154934e
		TIME	28.26707	28.26707	27.88405	27.88405	25.66252	28.26707
53	GLOBAL	MAXIMUM	-0.2786658e-05	0.1144416e-21	0.1756837e-14	0.5541504e-24	0.4159612e-06	0.9607097e
		TIME	29.18633	29.18633	27.88405	28.26707	28.34368	29.18633
54	GLOBAL	MAXIMUM	-0.2297811e-05	0.5171463e-23	0.1767956e-14	0.6948984e-15	-0.3274795e-29	0.8361507e
		TIME	29.18633	29.18633	27.88405	27.88405	25.66252	29.18633
55	GLOBAL	MAXIMUM	-0.2833091e-05	0.1204309e-21	0.1780912e-14	-0.2821123e-23	-0.3781012e-06	0.9765387e
		TIME	29.18633	29.18633	27.88405	27.88405	28.26707	29.18633
56	GLOBAL	MAXIMUM	-0.3139555e-05	0.1434706e-22	0.1793867e-14	0.7050828e-15	-0.3295388e-29	0.1142778e
		TIME	29.26293	29.18633	27.88405	27.88405	25.66252	29.26293
57	GLOBAL	MAXIMUM	-0.3368394e-05	0.1533831e-21	0.1808686e-14	-0.5187444e-23	0.1222887e-06	0.1169726e
		TIME	28.26707	28.26707	27.88405	27.88405	29.18633	28.26707
58	GLOBAL	MAXIMUM	-0.3365505e-05	0.3248797e-22	0.1823506e-14	0.7167323e-15	-0.3319492e-29	0.1225398e
		TIME	28.26707	27.88405	27.88405	27.88405	25.66252	28.26707
59	GLOBAL	MAXIMUM	-0.2854973e-05	0.1355532e-21	0.1840220e-14	0.2789754e-23	0.4531685e-06	0.9835768e
		TIME	28.19047	28.19047	27.88405	27.88405	26.96480	28.19047
60	GLOBAL	MAXIMUM	-0.2182217e-05	0.2244462e-22	0.1856934e-14	0.7298713e-15	-0.3347130e-29	0.7941676e
		TIME	28.11386	27.88405	27.88405	27.88405	25.66252	28.11386
61	GLOBAL	MAXIMUM	-0.2244471e-05	0.1108038e-21	0.1875577e-14	-0.5529650e-23	0.1468311e-06	0.7600770e
		TIME	28.11386	28.11386	27.88405	27.88405	21.52588	28.11386
62	GLOBAL	MAXIMUM	-0.1995150e-05	0.4235135e-22	0.1894221e-14	0.7445269e-15	-0.3379007e-29	0.7259865e
		TIME	28.11386	27.88405	27.88405	27.88405	25.66252	28.11386
63	GLOBAL	MAXIMUM	-0.2890820e-05	0.1538305e-21	0.1914832e-14	-0.5974211e-23	-0.5705186e-06	0.9939766e
		TIME	25.66252	25.66252	27.88405	27.88405	28.26707	25.66252
64	GLOBAL	MAXIMUM	-0.3579003e-05	0.6385849e-22	0.1935444e-14	0.7607297e-15	-0.3414481e-29	0.1303300e
		TIME	25.66252	27.88405	27.88405	27.88405	25.66252	25.66252
65	GLOBAL	MAXIMUM	-0.2275099e-05	0.1290441e-21	0.1958066e-14	0.6086695e-23	0.8147778e-06	0.7787634e
		TIME	25.66252	28.26707	27.88405	27.88405	25.66252	25.66252
66	GLOBAL	MAXIMUM	-0.6458023e-06	0.4194622e-22	0.1980689e-14	0.7785133e-15	0.	0.2542257e
		TIME	25.66252	27.88405	27.88405	27.88405	0.	25.66252

36	GLOBAL	MAXIMUM	-0.6502983e-06	0.1258812e-26	-0.6415528e-10	-0.2529522e-10	0.3794565e-25	0.2566657e-
		TIME	25.66252	25.66252	25.66252	25.66252	25.66252	25.66252
38	GLOBAL	MAXIMUM	-0.3175494e-06	0.4426814e-27	-0.4932847e-30	0.	0.	0.1233905e-
		TIME	29.33954	29.33954	25.66252	0.	0.	29.33954
39	GLOBAL	MAXIMUM	-0.6480881e-06	0.2999487e-24	-0.5347385e-25	-0.2108374e-25	-0.3789732e-25	0.2557934e-
		TIME	25.66252	25.66252	25.66252	25.66252	25.66252	25.66252
42	GLOBAL	MAXIMUM	-0.6458429e-06	0.6672955e-25	-0.2558559e-13	-0.9336457e-14	-0.1667938e-29	0.2538498e-
		TIME	25.66252	25.66252	27.88405	27.88405	27.88405	25.66252

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIO
1	GLOBAL	MAXIMUM	0.7255201e-04	0.3841541e-22	0.5714403e-11	0.2246057e-11	0.	-0.2843652e-
		TIME	25.27950	29.95237	20.07039	20.07039	0.	25.27950
3	GLOBAL	MAXIMUM	0.1484149e-03	0.2309143e-21	0.5720589e-11	0.2248488e-11	-0.2767941e-29	-0.5353621e-
		TIME	18.99792	18.99792	20.07039	20.07039	20.07039	18.99792
5	GLOBAL	MAXIMUM	-0.8349525e-04	0.1488250e-21	0.5732968e-11	0.2253354e-11	-0.2774182e-29	0.2991465e-
		TIME	29.03312	28.03726	20.07039	20.07039	20.07039	29.03312
11	GLOBAL	MAXIMUM	0.7987927e-04	0.1669259e-21	0.5807429e-11	0.2282621e-11	-0.2811301e-29	-0.2907289e-
		TIME	19.99378	19.99378	20.07039	20.07039	20.07039	19.99378
17	GLOBAL	MAXIMUM	-0.7862299e-04	0.7338818e-19	0.5938512e-11	0.2332312e-11	-0.2320881e-29	0.2855094e-
		TIME	18.76811	20.07039	20.07039	20.07039	20.07039	18.76811
19	GLOBAL	MAXIMUM	-0.8160570e-04	0.1252311e-18	0.5996170e-11	0.2356806e-11	-0.2904892e-29	0.2946803e-
		TIME	18.76811	20.07039	20.07039	20.07039	20.07039	18.76811
44	GLOBAL	MAXIMUM	0.7271657e-04	-0.3838327e-22	-0.3061599e-12	-0.1203367e-12	-0.1320830e-28	-0.2857326e-
		TIME	25.27950	29.95237	22.98136	22.98136	22.98136	25.27950
24	GLOBAL	MAXIMUM	0.	0.	0.	0.1925781e-13	0.	-0.2451853e-
		TIME	0.	0.	0.	20.07039	0.	25.27950
25	GLOBAL	MAXIMUM	0.1118356e-04	0.	0.	0.1927866e-13	0.	-0.4659003e-
		TIME	18.99792	0.	0.	20.07039	0.	18.99792
26	GLOBAL	MAXIMUM	-0.6713549e-05	0.	0.	0.1932037e-13	0.	0.2610069e-
		TIME	29.03312	0.	0.	20.07039	0.	29.03312
27	GLOBAL	MAXIMUM	0.7523559e-05	0.	0.	0.1938301e-13	0.	-0.3043069e-
		TIME	23.74741	0.	0.	20.07039	0.	19.99378
28	GLOBAL	MAXIMUM	-0.6309846e-05	0.	0.	0.1946662e-13	0.	0.2524264e-
		TIME	18.84472	0.	0.	20.07039	0.	18.84472
29	GLOBAL	MAXIMUM	-0.6646343e-05	0.	0.	0.1957131e-13	0.	-0.2492471e-
		TIME	18.76811	0.	0.	20.07039	0.	19.99378
30	GLOBAL	MAXIMUM	0.6597042e-05	0.	0.	0.1969719e-13	0.	-0.2786245e-
		TIME	19.99378	0.	0.	20.07039	0.	19.99378
31	GLOBAL	MAXIMUM	0.7408449e-05	0.	0.	0.1984438e-13	0.	-0.2955795e-
		TIME	23.74741	0.	0.	20.07039	0.	23.74741
32	GLOBAL	MAXIMUM	-0.5898202e-05	0.	0.	0.2367517e-13	0.	0.2900463e-
		TIME	18.76811	0.	0.	20.07039	0.	18.76811
33	GLOBAL	MAXIMUM	-0.6730517e-05	0.	0.	0.2020738e-13	0.	0.2520082e-
		TIME	18.76811	0.	0.	20.07039	0.	18.76811
34	GLOBAL	MAXIMUM	-0.9244367e-05	0.	0.	0.2042356e-13	0.	0.3755351e-
		TIME	18.84472	0.	0.	20.07039	0.	18.84472
35	GLOBAL	MAXIMUM	0.	0.	0.	0.2066186e-13	0.	0.1719749e-
		TIME	0.	0.	0.	20.07039	0.	20.30020
67	GLOBAL	MAXIMUM	0.	0.	0.	-0.1031773e-14	0.	-0.2451273e-
		TIME	0.	0.	0.	22.98136	0.	25.27950
68	GLOBAL	MAXIMUM	0.1098464e-04	0.	0.	-0.1036606e-14	0.	-0.4638408e-
		TIME	18.99792	0.	0.	22.98136	0.	18.99792
69	GLOBAL	MAXIMUM	-0.6591102e-05	0.	0.	-0.1043594e-14	0.	0.2598205e-
		TIME	29.03312	0.	0.	22.98136	0.	29.03312

70	GLOBAL	MAXIMUM	0.7454604e-05	0.	0.	-0.1052749e-14	0.	-0.3030551e-
		TIME	23.74741	0.	0.	22.98136	0.	19.99378
71	GLOBAL	MAXIMUM	-0.6301271e-05	0.	0.	-0.1064093e-14	0.	0.2522973e-
		TIME	18.84472	0.	0.	22.98136	0.	18.84472
72	GLOBAL	MAXIMUM	-0.6616511e-05	0.	0.	-0.1077647e-14	0.	-0.2493441e-
		TIME	18.76811	0.	0.	22.98136	0.	19.99378
73	GLOBAL	MAXIMUM	0.6574645e-05	0.	0.	-0.1093441e-14	0.	-0.2783105e-
		TIME	19.99378	0.	0.	22.98136	0.	19.99378
74	GLOBAL	MAXIMUM	0.7352839e-05	0.	0.	-0.1111507e-14	0.	-0.2948752e-
		TIME	23.74741	0.	0.	22.98136	0.	23.74741
75	GLOBAL	MAXIMUM	-0.6536825e-05	0.	0.	-0.1131883e-14	0.	0.2430314e-
		TIME	18.76811	0.	0.	22.98136	0.	18.76811
76	GLOBAL	MAXIMUM	-0.6751338e-05	0.	0.	-0.1154611e-14	0.	0.2523650e-
		TIME	18.76811	0.	0.	22.98136	0.	18.76811
77	GLOBAL	MAXIMUM	-0.9109291e-05	0.	0.	-0.1179738e-14	0.	0.3739648e-
		TIME	18.84472	0.	0.	22.98136	0.	18.84472
78	GLOBAL	MAXIMUM	0.	0.	0.	-0.1207317e-14	0.	0.1706875e-
		TIME	0.	0.	0.	22.98136	0.	20.30020
37	GLOBAL	MAXIMUM	0.	0.	-0.5510008e-11	-0.2407873e-12	0.	0.4854175e-
		TIME	0.	0.	20.07039	20.07039	0.	20.30020
40	GLOBAL	MAXIMUM	0.	0.	-0.8216682e-29	0.	0.	-0.8947073e-
		TIME	0.	0.	20.07039	0.	0.	25.27950
41	GLOBAL	MAXIMUM	0.	0.	-0.4589279e-26	-0.2005515e-27	0.	0.4842264e-
		TIME	0.	0.	20.07039	20.07039	0.	20.30020
43	GLOBAL	MAXIMUM	0.	0.	0.3313263e-12	0.1447896e-13	0.	0.1707239e-
		TIME	0.	0.	22.98136	22.98136	0.	20.30020

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIC
2	GLOBAL	MAXIMUM	-0.1022246e-03	0.8187639e-21	0.5717496e-11	-0.5417711e-22	0.5156311e-04	0.2824258e-
		TIME	21.14285	29.95237	20.07039	18.99792	20.91304	18.76811
4	GLOBAL	MAXIMUM	0.1039248e-03	0.1026683e-20	0.5726778e-11	0.6109635e-22	-0.5031087e-04	-0.3443358e-
		TIME	28.03726	28.03726	20.07039	20.91304	20.91304	28.03726
6	GLOBAL	MAXIMUM	-0.7290684e-04	-0.7813259e-20	0.5742260e-11	0.4147753e-20	0.4227194e-04	0.2367132e-
		TIME	22.59834	20.07039	20.07039	20.07039	29.49275	26.50517
7	GLOBAL	MAXIMUM	0.9703764e-04	-0.1503025e-19	0.5751553e-11	0.2260658e-11	-0.2783481e-29	-0.3508248e-
		TIME	19.99378	20.07039	20.07039	20.07039	20.07039	19.99378
8	GLOBAL	MAXIMUM	-0.8919498e-04	-0.7458895e-20	0.5763959e-11	-0.4178057e-20	-0.2013578e-04	0.3067842e-
		TIME	18.84472	20.07039	20.07039	20.07039	24.28364	18.84472
9	GLOBAL	MAXIMUM	-0.8117258e-04	-0.1655948e-21	0.5776364e-11	0.2270411e-11	-0.2795850e-29	0.2940901e-
		TIME	18.84472	18.84472	20.07039	20.07039	20.07039	18.84472
10	GLOBAL	MAXIMUM	0.7833726e-04	0.8416381e-21	0.5791897e-11	-0.3013135e-22	-0.2437828e-04	-0.2760529e-
		TIME	19.99378	19.99378	20.07039	28.57349	19.22774	19.99378
12	GLOBAL	MAXIMUM	0.8822398e-04	0.1540507e-19	0.5826105e-11	-0.8488897e-20	0.2215329e-04	-0.3074113e-
		TIME	19.99378	20.07039	20.07039	20.07039	19.22774	19.99378
13	GLOBAL	MAXIMUM	0.8916374e-04	0.3057031e-19	0.5844780e-11	0.2297302e-11	-0.2829852e-29	-0.3240936e-
		TIME	19.99378	20.07039	20.07039	20.07039	20.07039	19.99378
14	GLOBAL	MAXIMUM	0.8641604e-04	0.6146090e-19	0.5866620e-11	-0.1714020e-19	-0.1272120e-04	-0.2963466e-
		TIME	23.74741	20.07039	20.07039	20.07039	29.26293	23.74741
15	GLOBAL	MAXIMUM	0.9484408e-04	0.9227499e-19	0.5888459e-11	0.2314470e-11	-0.2851525e-29	-0.3425884e-
		TIME	23.74741	20.07039	20.07039	20.07039	20.07039	23.74741
16	GLOBAL	MAXIMUM	-0.7800306e-04	0.8274623e-19	0.5913485e-11	0.5246336e-20	-0.2400145e-04	0.2629926e-
		TIME	18.76811	20.07039	20.07039	20.07039	19.22774	18.76811
18	GLOBAL	MAXIMUM	-0.8671325e-04	0.9910868e-19	0.5967341e-11	-0.1440083e-19	-0.1359830e-04	0.2900948e-
		TIME	18.76811	20.07039	20.07039	20.07039	21.52588	18.76811

20	GLOBAL	MAXIMUM	-0.1037490e-03	0.1571483e-18	0.6028245e-11	-0.1795684e-19	-0.3042386e-04	0.3506585e-0
		TIME	18.76811	20.07039	20.07039	20.07039	20.83643	18.76811
21	GLOBAL	MAXIMUM	-0.1200237e-03	0.1898757e-18	0.6060320e-11	0.2382020e-11	-0.2936647e-29	0.4328284e-0
		TIME	18.84472	20.07039	20.07039	20.07039	20.07039	18.84472
22	GLOBAL	MAXIMUM	0.8487402e-04	0.1585677e-18	0.6095674e-11	0.1715989e-19	0.4060965e-04	0.2731326e-0
		TIME	25.66252	20.07039	20.07039	20.07039	20.14699	26.04554
23	GLOBAL	MAXIMUM	-0.5103417e-04	0.1281001e-18	0.6131029e-11	0.2409812e-11	-0.5056640e-27	0.2006056e-0
		TIME	20.30020	20.07039	20.07039	20.07039	20.07039	20.30020
45	GLOBAL	MAXIMUM	-0.1023443e-03	0.3329391e-20	-0.3068770e-12	0.5416370e-22	0.5161637e-04	0.2832891e-0
		TIME	21.14285	18.76811	22.98136	18.99792	20.91304	18.76811
46	GLOBAL	MAXIMUM	0.1485175e-03	-0.2309143e-21	-0.3075940e-12	-0.1209004e-12	-0.2629544e-27	-0.5401654e-0
		TIME	18.99792	18.99792	22.98136	22.98136	20.07039	18.99792
47	GLOBAL	MAXIMUM	0.1039636e-03	-0.4095070e-20	-0.3086307e-12	-0.6109613e-22	-0.5036091e-04	-0.3459004e-0
		TIME	28.03726	28.03726	22.98136	20.91304	20.91304	28.03726
48	GLOBAL	MAXIMUM	-0.8361998e-04	-0.1488250e-21	-0.3096673e-12	-0.1217153e-12	-0.2635473e-27	0.3024934e-0
		TIME	29.03312	28.03726	22.98136	22.98136	20.07039	29.03312
49	GLOBAL	MAXIMUM	-0.7294198e-04	0.2872399e-20	-0.3110257e-12	-0.2079029e-21	0.4230657e-04	0.2368500e-0
		TIME	22.59834	22.59834	22.98136	20.14699	29.49275	26.50517
50	GLOBAL	MAXIMUM	0.9702986e-04	0.7554629e-21	-0.3123841e-12	-0.1227832e-12	-0.2644307e-27	-0.3530389e-0
		TIME	19.99378	23.97722	22.98136	22.98136	20.07039	19.99378
51	GLOBAL	MAXIMUM	-0.8921458e-04	-0.3700797e-20	-0.3140671e-12	-0.2282134e-21	-0.2013867e-04	0.3075610e-0
		TIME	18.84472	19.91718	22.98136	20.30020	24.28364	18.84472
52	GLOBAL	MAXIMUM	-0.8116192e-04	0.1655948e-21	-0.3157501e-12	-0.1241061e-12	-0.2656057e-27	0.2942254e-0
		TIME	18.84472	18.84472	22.98136	22.98136	20.07039	18.84472
53	GLOBAL	MAXIMUM	0.7834870e-04	-0.3288542e-20	-0.3177611e-12	0.3013135e-22	-0.2438086e-04	-0.2758249e-0
		TIME	19.99378	19.99378	22.98136	28.57349	19.22774	19.99378
54	GLOBAL	MAXIMUM	0.7990740e-04	-0.1669259e-21	-0.3197721e-12	-0.1256870e-12	-0.2670736e-27	-0.2908151e-0
		TIME	19.99378	19.99378	22.98136	22.98136	20.07039	19.99378
55	GLOBAL	MAXIMUM	0.8824060e-04	-0.3639068e-20	-0.3221154e-12	0.4904640e-21	0.2215578e-04	-0.3076617e-0
		TIME	19.99378	19.99378	22.98136	22.98136	19.22774	19.99378
56	GLOBAL	MAXIMUM	0.8914706e-04	0.1800998e-20	-0.3244587e-12	-0.1275291e-12	-0.2688359e-27	-0.3245082e-0
		TIME	19.99378	20.30020	22.98136	22.98136	20.07039	19.99378
57	GLOBAL	MAXIMUM	0.8643622e-04	-0.5523107e-20	-0.3271391e-12	0.9714055e-21	-0.1272128e-04	-0.2967060e-0
		TIME	23.74741	22.98136	22.98136	22.98136	29.26293	23.74741
58	GLOBAL	MAXIMUM	0.9482380e-04	-0.5269607e-20	-0.3298195e-12	-0.1296362e-12	-0.2708948e-27	-0.3436957e-0
		TIME	23.74741	22.98136	22.98136	22.98136	20.07039	23.74741
59	GLOBAL	MAXIMUM	-0.7802698e-04	0.5826812e-20	-0.3328426e-12	-0.4825092e-21	-0.2400516e-04	0.2619323e-0
		TIME	18.76811	24.13043	22.98136	22.98136	19.22774	18.76811
60	GLOBAL	MAXIMUM	-0.7864894e-04	0.3540113e-20	-0.3358657e-12	-0.1320126e-12	-0.2732526e-27	0.2834260e-0
		TIME	18.76811	20.30020	22.98136	22.98136	20.07039	18.76811
61	GLOBAL	MAXIMUM	-0.8674302e-04	0.5878970e-20	-0.3392377e-12	-0.1006919e-20	-0.1360580e-04	0.2889192e-0
		TIME	18.76811	20.30020	22.98136	20.30020	21.52588	18.76811
62	GLOBAL	MAXIMUM	-0.8164574e-04	0.7165019e-20	-0.3426098e-12	-0.1346634e-12	-0.2759648e-27	0.2944123e-0
		TIME	18.76811	20.30020	22.98136	22.98136	20.07039	18.76811
63	GLOBAL	MAXIMUM	-0.1037781e-03	0.1037721e-19	-0.3463378e-12	-0.1076904e-20	-0.3043251e-04	0.3513998e-0
		TIME	18.76811	20.30020	22.98136	20.30020	20.83643	18.76811
64	GLOBAL	MAXIMUM	-0.1200100e-03	0.1104187e-19	-0.3500658e-12	-0.1375940e-12	-0.2789815e-27	0.4356335e-0
		TIME	18.84472	20.30020	22.98136	22.98136	20.07039	18.84472
65	GLOBAL	MAXIMUM	0.8492443e-04	-0.1161644e-19	-0.3541576e-12	0.9874835e-21	0.4057205e-04	0.2728585e-0
		TIME	25.66252	19.15113	22.98136	20.30020	20.14699	26.04554
66	GLOBAL	MAXIMUM	-0.5064897e-04	-0.7497376e-20	-0.3582493e-12	-0.1408106e-12	0.5222565e-29	0.1990790e-0
		TIME	20.30020	22.98136	22.98136	22.98136	22.98136	20.30020
36	GLOBAL	MAXIMUM	-0.5092200e-04	0.9512923e-25	-0.5038071e-08	-0.1986417e-08	0.2979847e-23	0.2009836e-0
		TIME	20.30020	20.07039	20.07039	20.07039	20.07039	20.30020
38	GLOBAL	MAXIMUM	0.7255189e-04	-0.8551935e-25	-0.3733361e-28	-0.1131399e-28	-0.6491745e-28	-0.2819155e-0
		TIME	25.27950	25.27950	20.07039	20.07039	20.07039	25.27950
39	GLOBAL	MAXIMUM	-0.5079705e-04	0.2350585e-22	-0.4196203e-23	-0.1654484e-23	-0.2976051e-23	0.2004905e-0
		TIME	20.30020	20.30020	20.07039	20.07039	20.07039	20.30020

```
 42        GLOBAL     MAXIMUM   -0.5065921e-04   0.5226677e-23   0.4627694e-11   0.1688695e-11   0.3016818e-27   0.1991170e-
                       TIME        20.30020        20.30020        22.98136        22.98136        22.98136        20.30020
 (  172) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  172) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  172) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  172) > $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  172) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:37:0.7         Elapsed time: 1:44:37.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  14 pools of 524288 bytes total 7340032 bytes (5521%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 2, R_Get 70, R_Put 1, R_Del 1
 B_Read 4, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 2.2 CRANE INDUCED VIBRATIONS - RESULTS OF FOURIER ANALYSIS

**** ACTIVE UNITS -	LENGTH	WEIGHT	ANGLE	TEMPERATURE	TIME
**** ASSUMED TO BE	INCH	POUND	RADIAN	FAHRENHEIT	SECOND

```
(    2) > units m n
(    3) > type space frame
(    4) > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

```
(    5) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

```
(    6) > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

```
(    7) > repeat 1 id 43 x 14.4
```

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
{    8} > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
{    9} > joints coordinates
{   10} > 36 3.6 3.8 39.6 F
{   11} > 37 3.6 0.0 39.6 S
{   12} > 38 7.2 3.8 0.0 F
{   13} > 39 7.2 3.8 39.6 F
{   14} > 40 7.2 0.0 0.0 S
{   15} > 41 7.2 0.0 39.6 S
{   16} > 42 10.8 3.8 39.6 F
{   17} > 43 10.8 0.0 39.6 S
{   18} > member incidences
{   19} > 'b1' 1 2
{   20} > 'b2' 2 3
{   21} > 'b3' 3 4
{   22} > 'b4' 4 5
{   23} > 'b5' 5 6
{   24} > 'b6' 6 7
{   25} > 'b7' 7 8
{   26} > 'b8' 8 9
{   27} > 'b9' 9 10
{   28} > 'b10' 10 11
{   29} > 'b11' 11 12
{   30} > 'b12' 12 13
{   31} > 'b13' 13 14
{   32} > 'b14' 14 15
{   33} > 'b15' 15 16
{   34} > 'b16' 16 17
{   35} > 'b17' 17 18
{   36} > 'b18' 18 19
{   37} > 'b19' 19 20
{   38} > member incidences
{   39} > 'b20' 20 21
{   40} > 'b21' 21 22
{   41} > 'b22' 22 23
{   42} > 'ba23'  1 38
{   43} > 'ba24' 38 44
{   44} > 'bb25'  2 45
{   45} > 'bb26'  3 46
{   46} > 'bb27'  4 47
{   47} > 'bb28'  5 48
{   48} > 'bb29'  6 49
{   49} > 'bb30'  7 50
{   50} > 'bb31'  8 51
{   51} > 'bb32'  9 52
{   52} > 'bb33' 10 53
{   53} > 'bb34' 11 54
{   54} > 'bb35' 12 55
{   55} > 'bb36' 13 56
{   56} > 'bb37' 14 57
{   57} > 'bb38' 15 58
{   58} > 'bb39' 16 59
{   59} > 'bb40' 17 60
{   60} > 'bb41' 18 61
{   61} > member incidences
{   62} > 'bb42' 19 62
{   63} > 'bb43' 20 63
{   64} > 'bb44' 21 64
{   65} > 'bb45' 22 65
{   66} > 'bc46' 23 36
{   67} > 'bc47' 36 39
{   68} > 'bc48' 39 42
{   69} > 'bc49' 42 66
{   70} > 'bd50' 44 45
{   71} > 'bd51' 45 46
{   72} > 'bd52' 46 47
{   73} > 'bd53' 47 48
{   74} > 'bd54' 48 49
{   75} > 'bd55' 49 50
{   76} > 'bd56' 50 51
{   77} > 'bd57' 51 52
```

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(   78) > 'bd58' 52 53
(   79) > 'bd59' 53 54
(   80) > 'bd60' 54 55
(   81) > 'bd61' 55 56
(   82) > 'bd62' 56 57
(   83) > 'bd63' 57 58
(   84) > 'bd64' 58 59
(   85) > 'bd65' 59 60
(   86) > 'bd66' 60 61
(   87) > 'bd67' 61 62
(   88) > 'bd68' 62 63
(   89) > 'bd69' 63 64
(   90) > 'bd70' 64 65
(   91) > member incidences
(   92) > 'bd71' 65 66
(   93) > 's72'  24  1
(   94) > 's73'  25  3
(   95) > 's74'  26  5
(   96) > 's75'  27  7
(   97) > 's76'  28  9
(   98) > 's77'  29 11
(   99) > 's78'  30 13
(  100) > 's79'  31 15
(  101) > 's80'  32 17
(  102) > 's81'  33 19
(  103) > 's82'  34 21
(  104) > 's83'  35 23
(  105) > 's84'  37 36
(  106) > 's85'  40 38
(  107) > 's86'  41 39
(  108) > 's87'  43 42
(  109) > 's88'  67 44
(  110) > 's89'  68 46
(  111) > 's90'  69 48
(  112) > 's91'  70 50
(  113) > 's92'  71 52
(  114) > 's93'  72 54
(  115) > 's94'  73 56
(  116) > 's95'  74 58
(  117) > 's96'  75 60
(  118) > 's97'  76 62
(  119) > 's98'  77 64
(  120) > 's99'  78 66
(  121) >
(  121) > joint releases
(  122) > 25 to 34 kfx 1.15E7
(  123) > 68 to 77 kfx 1.15E7
(  124) > 40 37 41 43 kfz 1.15E7
(  125) > 1 for y for z mom x mom y mom z kfx  3.2574E6
(  126) > 3 for y for z mom x mom y mom z kfx 7.0822E5
(  127) > 5 for y for z mom x mom y mom z kfx 2.1247E6
(  128) > 11 for y for z mom x mom y mom z kfx 7.0822E5
(  129) > 17 for y for z mom x mom y mom z kfx 7.0822E5
(  130) > 19 for y for z mom x mom y mom z kfx 1.11225E6
(  131) > 44 for x for y mom x mom y mom z kfz 1.11225E6
(  132) > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
(  133) > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
(  134) >
(  134) > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
(  135) >
(  135) > member releases
(  136) > 'bb25' to 'bb45' start           moment x y z end moment y z
(  137) > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
(  138) > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
(  139) > 'ba23' 'ba24' start mom x y z end mom z y
(  140) > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
(  141) > member eccentricities
(  142) > 'bb25' to 'bb45' start x 0.15
(  143) > member properties prismatic
(  144) > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
(  145) > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
(  146) > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
(  147) > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
(  148) > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
(  149) > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  150) > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  151) > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
(  152) > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
(  153) > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
(  154) > material constants
(  155) > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
(  156) > material concrete 's85' 's80' 'bb25' to 'bb45'
(  157) > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
(  158) > material steel 'bd50' to 'bd71'
(  159) > constants beta 0.0 all
(  160) > dead load 'dl' direction -y all members
(  161) > damping percents 2.5 50
(  162) > inertia of joints lumped
```

```
(  163) > dynamic degrees of freedom with static condensation
(  164) > generate  70 from joints translations x

(  165) >   dynamic loading 2.2
(  166) >    support acceleration
(  167) >   transl x function  sin ampl 0.38000 freq 516.7327913   phase 0.0
(  168) >    integrate from 0.0 to  30.00 at 0.07660454
(  169) >     end of dynamic loading
(  170) >     dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                        19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS      16.383
                                                 ------
                                                 35.690
                                                 ======


 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS     4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                         2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS       1.021
                                                 ------
                                                  3.572
                                                 ======
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.43 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.45 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES    1.95 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.46 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.21 SECONDS
 TIME TO PROCESS   78 JOINTS                      3.95 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.30 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.61 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX       10.08 SECONDS
 TIME FOR CONDENSATION                          238.03 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.33 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.40 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.88 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.33 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.48 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.11 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        99.80 SECONDS

 ************************
 * EIGEN-SOLUTION CHECKS *
 ************************


 MODE------EIGENVALUE-------FREQUENCY-------FREQUENCY--------PERIOD--------ESTIMATED---/
         ((RAD/SEC)**2)      (RAD/SEC)        (CYC/SEC)        (SEC/CYC)       ACCURACY

    1     6.727454d+01    8.202106d+00    1.305406d+00    7.660454d-01    1.682314d-10
    2     6.954759d+01    8.339520d+00    1.327276d+00    7.534229d-01    1.715818d-10
    3     7.757453d+01    8.807640d+00    1.401780d+00    7.133790d-01    5.332525d-11
    4     8.785211d+01    9.372946d+00    1.491751d+00    6.703533d-01    1.053954d-10
    5     9.546691d+01    9.770717d+00    1.555058d+00    6.430629d-01    9.126849d-11
    6     1.111998d+02    1.054513d+01    1.678310d+00    5.958377d-01    4.898725d-11
    7     1.195056d+02    1.093186d+01    1.739860d+00    5.747590d-01    4.387047d-11
    8     1.396344d+02    1.181670d+01    1.880686d+00    5.317208d-01    4.177525d-11
    9     1.677455d+02    1.295166d+01    2.061321d+00    4.851258d-01    1.219794d-12
   10     2.066677d+02    1.437594d+01    2.288002d+00    4.370625d-01    3.011305d-11
   11     4.878849d+02    2.208812d+01    3.515433d+00    2.844600d-01    2.553983d-11
   12     8.257434d+02    2.873575d+01    4.573437d+00    2.186539d-01    1.439964d-12
   13     1.399263d+03    3.740672d+01    5.953465d+00    1.679694d-01    1.660736d-12
   14     1.500251d+03    3.873308d+01    6.164561d+00    1.622176d-01    7.436474d-12
   15     1.649781d+03    4.061750d+01    6.464476d+00    1.546916d-01    7.459423d-12
   16     1.838761d+03    4.288077d+01    6.824687d+00    1.465269d-01    1.807695d-12
   17     2.046501d+03    4.523827d+01    7.199894d+00    1.388909d-01    4.440182d-13
   18     2.254418d+03    4.748071d+01    7.556789d+00    1.323313d-01    2.205616d-12
   19     2.446104d+03    4.945810d+01    7.871501d+00    1.270406d-01    3.810084d-12
   20     2.586623d+03    5.085885d+01    8.094437d+00    1.235416d-01    2.089889d-12
   21     2.674139d+03    5.171207d+01    8.230232d+00    1.215033d-01    2.045214d-12
   22     3.563408d+03    5.969429d+01    9.500641d+00    1.052561d-01    3.623298d-13
   23     4.780143d+03    6.913858d+01    1.100375d+01    9.087814d-02    1.458916d-12
   24     2.609301d+04    1.615333d+02    2.570882d+01    3.889715d-02    2.697309d-13
   25     2.806204d+04    1.675173d+02    2.666120d+01    3.750769d-02    2.082313d-13
   26     2.806495d+04    1.675260d+02    2.666258d+01    3.750574d-02    9.168077d-14
```

27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

TIME TO CHECK EIGENSOLUTION 50.38 SECONDS
TIME TO COMPUTE TIME HISTORY RESPONSE 1598.30 SECONDS
(171) > list dynamic max dis max acc times all joints all

1

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - test1 TITLE - NONE GIVEN

ACTIVE UNITS M N RAD DEGF SEC

LOADING - 11

MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIO
1	GLOBAL	MAXIMUM	-0.1098793e-02	-0.4876850e-21	0.2295533e-09	0.9022635e-10	0.	0.4300421e-
		TIME	0.8426499	0.1532091	0.9192544	0.9192544	0.	0.8426499
3	GLOBAL	MAXIMUM	-0.2087679e-02	0.3204414e-20	0.2298018e-09	0.9032403e-10	-0.1057933e-27	-0.7584321e-
		TIME	0.6894408	1.072464	0.9192544	0.9192544	0.9192544	1.072464
5	GLOBAL	MAXIMUM	-0.1323168e-02	-0.2994389e-20	0.2302991e-09	0.9051948e-10	-0.1060076e-27	0.4867372e-
		TIME	0.1532091	0.1532091	0.9192544	0.9192544	0.9192544	0.1532091
11	GLOBAL	MAXIMUM	-0.1537007e-02	-0.3295322e-20	0.2332903e-09	0.9169517e-10	-0.1073214e-27	0.5639558e-
		TIME	0.1532091	0.1532091	0.9192544	0.9192544	0.9192544	0.1532091
17	GLOBAL	MAXIMUM	-0.1536640e-02	0.2947628e-17	0.2385560e-09	0.9369132e-10	-0.8847651e-28	0.5561925e-
		TIME	0.1532091	0.9192544	0.9192544	0.9192544	0.9192544	0.1532091
19	GLOBAL	MAXIMUM	-0.1475644e-02	0.5032267e-17	0.2408722e-09	0.9467526e-10	-0.1106803e-27	0.5417175e-
		TIME	0.1532091	0.9192544	0.9192544	0.9192544	0.9192544	0.1532091
44	GLOBAL	MAXIMUM	-0.1101882e-02	0.4870590e-21	-0.7124214e-11	-0.2800185e-11	-0.3073516e-27	0.4329100e-
		TIME	0.8426499	0.1532091	1.072464	1.072464	1.072464	0.8426499
24	GLOBAL	MAXIMUM	0.	0.	0.	0.7736055e-12	0.	0.3718631e-
		TIME	0.	0.	0.	0.9192544	0.	0.8426499
25	GLOBAL	MAXIMUM	-0.1422957e-03	0.	0.	0.7744430e-12	0.	0.6609533e-
		TIME	0.6894408	0.	0.	0.9192544	0.	0.6894408
26	GLOBAL	MAXIMUM	-0.8752088e-04	0.	0.	0.7761188e-12	0.	0.4155147e-
		TIME	0.1532091	0.	0.	0.9192544	0.	0.1532091
27	GLOBAL	MAXIMUM	0.1269161e-03	0.	0.	0.7786348e-12	0.	-0.5828082e-
		TIME	0.5362318	0.	0.	0.9192544	0.	0.5362318
28	GLOBAL	MAXIMUM	-0.1279373e-03	0.	0.	0.7819938e-12	0.	0.5876882e-
		TIME	0.9958590	0.	0.	0.9192544	0.	0.9958590
29	GLOBAL	MAXIMUM	-0.1030439e-03	0.	0.	0.7861992e-12	0.	0.4829685e-
		TIME	0.1532091	0.	0.	0.9192544	0.	0.1532091
30	GLOBAL	MAXIMUM	0.1224118e-03	0.	0.	0.7912558e-12	0.	-0.5650848e-
		TIME	0.6128363	0.	0.	0.9192544	0.	0.6128363
31	GLOBAL	MAXIMUM	-0.1326107e-03	0.	0.	0.7971689e-12	0.	0.6071559e-
		TIME	0.9958590	0.	0.	0.9192544	0.	0.9958590
32	GLOBAL	MAXIMUM	-0.1207768e-03	0.	0.	0.9510555e-12	0.	0.5643429e-
		TIME	0.1532091	0.	0.	0.9192544	0.	0.1532091
33	GLOBAL	MAXIMUM	-0.9862937e-04	0.	0.	0.8117507e-12	0.	0.4636528e-
		TIME	0.1532091	0.	0.	0.9192544	0.	0.1532091
34	GLOBAL	MAXIMUM	-0.1422622e-03	0.	0.	0.8204351e-12	0.	0.6449862e-
		TIME	0.2298136	0.	0.	0.9192544	0.	0.2298136
35	GLOBAL	MAXIMUM	0.	0.	0.	0.8300077e-12	0.	-0.8347099e-
		TIME	0.	0.	0.	0.9192544	0.	1.072464

67	GLOBAL	MAXIMUM	0.	0.	0.	-0.2400894e-13	0.	0.3714984e-0
		TIME	0.	0.	0.	1.072464	0.	0.8426499
68	GLOBAL	MAXIMUM	-0.1392490e-03	0.	0.	-0.2412140e-13	0.	0.6576078e-0
		TIME	0.6894408	0.	0.	1.072464	0.	0.6894408
69	GLOBAL	MAXIMUM	-0.8815414e-04	0.	0.	-0.2428399e-13	0.	0.4166575e-0
		TIME	0.1532091	0.	0.	1.072464	0.	0.1532091
70	GLOBAL	MAXIMUM	0.1257379e-03	0.	0.	-0.2449704e-13	0.	-0.5813006e-0
		TIME	0.5362318	0.	0.	1.072464	0.	0.5362318
71	GLOBAL	MAXIMUM	-0.1267533e-03	0.	0.	-0.2476099e-13	0.	0.5861733e-0
		TIME	0.9958590	0.	0.	1.072464	0.	0.9958590
72	GLOBAL	MAXIMUM	-0.1032321e-03	0.	0.	-0.2507640e-13	0.	0.4832840e-0
		TIME	0.1532091	0.	0.	1.072464	0.	0.1532091
73	GLOBAL	MAXIMUM	0.1216466e-03	0.	0.	-0.2544392e-13	0.	-0.5640774e-0
		TIME	0.6128363	0.	0.	1.072464	0.	0.6128363
74	GLOBAL	MAXIMUM	-0.1311836e-03	0.	0.	-0.2586431e-13	0.	0.6053469e-0
		TIME	0.9958590	0.	0.	1.072464	0.	0.9958590
75	GLOBAL	MAXIMUM	-0.1032111e-03	0.	0.	-0.2633845e-13	0.	0.4832187e-0
		TIME	0.1532091	0.	0.	1.072464	0.	0.1532091
76	GLOBAL	MAXIMUM	-0.9891484e-04	0.	0.	-0.2686732e-13	0.	0.4641770e-0
		TIME	0.1532091	0.	0.	1.072464	0.	0.1532091
77	GLOBAL	MAXIMUM	-0.1398940e-03	0.	0.	-0.2745202e-13	0.	0.6421005e-0
		TIME	0.2298136	0.	0.	1.072464	0.	0.2298136
78	GLOBAL	MAXIMUM	0.	0.	0.	-0.2809377e-13	0.	-0.8244797e-0
		TIME	0.	0.	0.	1.072464	0.	1.072464
37	GLOBAL	MAXIMUM	0.	0.	-0.2213425e-09	-0.9672669e-11	0.	-0.2345410e-0
		TIME	0.	0.	0.9192544	0.9192544	0.	1.072464
40	GLOBAL	MAXIMUM	0.	0.	-0.3466973e-27	-0.1515067e-28	0.	0.1355895e-0
		TIME	0.	0.	0.9192544	0.9192544	0.	0.8426499
41	GLOBAL	MAXIMUM	0.	0.	-0.1845362e-24	-0.8064230e-26	0.	-0.2338609e-0
		TIME	0.	0.	0.9192544	0.9192544	0.	1.072464
43	GLOBAL	MAXIMUM	0.	0.	0.7709826e-11	0.3369194e-12	0.	-0.8242316e-0
		TIME	0.	0.	1.072464	1.072464	0.	1.072464

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	0.1270112e-02	-0.1086514e-19	0.2296776e-09	-0.7643643e-21	-0.8296943e-03	0.3661716e-03
		TIME	0.4596272	0.1532091	0.9192544	1.072464	0.6894408	0.1532091
4	GLOBAL	MAXIMUM	-0.1663544e-02	-0.1701505e-19	0.2300505e-09	0.5676577e-21	0.4532679e-03	0.5644671e-03
		TIME	0.1532091	0.1532091	0.9192544	0.9958590	0.6894408	0.1532091
6	GLOBAL	MAXIMUM	-0.1643668e-02	-0.3137652e-18	0.2306724e-09	0.1681444e-18	0.4753067e-03	0.5521308e-03
		TIME	0.1532091	0.9192544	0.9192544	0.9192544	0.6128363	0.1532091
7	GLOBAL	MAXIMUM	0.1850389e-02	-0.6066929e-18	0.2310457e-09	0.9081293e-10	-0.1063335e-27	-0.6750737e-03
		TIME	0.5362318	0.9192544	0.9192544	0.9192544	0.9192544	0.5362318
8	GLOBAL	MAXIMUM	0.1917316e-02	-0.3205902e-18	0.2315440e-09	-0.1675643e-18	0.1557699e-03	-0.6624468e-03
		TIME	0.6128363	0.9192544	0.9192544	0.9192544	2.834368	0.6128363
9	GLOBAL	MAXIMUM	-0.1865859e-02	0.3557913e-20	0.2320424e-09	0.9120468e-10	-0.1067713e-27	-0.6809244e-03
		TIME	0.9958590	0.6128363	0.9192544	0.9192544	0.9192544	0.6128363
10	GLOBAL	MAXIMUM	-0.1704323e-02	-0.1780830e-19	0.2326663e-09	-0.4891167e-21	0.3809117e-03	0.5862391e-03
		TIME	0.1532091	0.1532091	0.9192544	0.9192544	0.9958590	0.1532091
12	GLOBAL	MAXIMUM	-0.1704726e-02	-0.6034079e-18	0.2340405e-09	-0.3403120e-18	-0.3360162e-03	0.5866050e-03
		TIME	0.1532091	1.072464	0.9192544	0.9192544	0.9958590	0.1532091
13	GLOBAL	MAXIMUM	0.1795405e-02	0.1223422e-17	0.2347907e-09	0.9228492e-10	-0.1079844e-27	-0.6560693e-03
		TIME	0.6128363	0.9192544	0.9192544	0.9192544	0.9192544	0.6128363
14	GLOBAL	MAXIMUM	0.1919810e-02	0.2447679e-17	0.2356680e-09	-0.6890555e-18	0.1889083e-03	-0.6680395e-03
		TIME	0.6128363	0.9192544	0.9192544	0.9192544	1.838509	0.6128363

15	GLOBAL	MAXIMUM	-0.1927055e-02	0.3704020e-17	0.2365453e-09	0.9297457e-10	-0.1087609e-27	0.7024636e-
		TIME	0.9958590	0.9192544	0.9192544	0.9192544	0.9192544	0.9958590
16	GLOBAL	MAXIMUM	-0.1703594e-02	0.3315480e-17	0.2375507e-09	0.2101090e-18	0.5276561e-03	0.5827804e-
		TIME	0.1532091	0.9192544	0.9192544	0.9192544	0.9958590	0.1532091
18	GLOBAL	MAXIMUM	-0.1645869e-02	0.3985116e-17	0.2397141e-09	-0.5790668e-18	0.1423023e-03	0.5489550e-
		TIME	0.1532091	0.9192544	0.9192544	0.9192544	1.838509	0.1532091
20	GLOBAL	MAXIMUM	-0.1725224e-02	0.6320657e-17	0.2421607e-09	-0.7211247e-18	-0.5909441e-03	0.5989881e-
		TIME	0.1532091	0.9192544	0.9192544	0.9192544	1.608695	0.1532091
21	GLOBAL	MAXIMUM	-0.2044120e-02	0.7628314e-17	0.2434491e-09	0.9568813e-10	-0.1118251e-27	0.7427633e-
		TIME	0.2298136	0.9192544	0.9192544	0.9192544	0.9192544	0.2298136
22	GLOBAL	MAXIMUM	-0.2481824e-02	0.6368692e-17	0.2448694e-09	0.6895967e-18	-0.9669222e-03	0.7493088e-
		TIME	0.9192544	0.9192544	0.9192544	0.9192544	1.225673	0.9192544
23	GLOBAL	MAXIMUM	0.2467159e-02	0.5145766e-17	0.2462896e-09	0.9680459e-10	-0.2031303e-25	-0.9658796e-
		TIME	1.072464	0.9192544	0.9192544	0.9192544	0.9192544	1.072464
45	GLOBAL	MAXIMUM	0.1272246e-02	0.4340007e-19	-0.7140900e-11	0.7638735e-21	-0.8308579e-03	0.3667598e-
		TIME	0.4596272	0.1532091	1.072464	1.072464	0.6894408	0.1532091
46	GLOBAL	MAXIMUM	-0.2088965e-02	-0.3204414e-20	-0.7157585e-11	-0.2813302e-11	-0.1005036e-25	0.7656988e-
		TIME	0.6894408	1.072464	1.072464	1.072464	0.9192544	0.6894408
47	GLOBAL	MAXIMUM	-0.1664099e-02	0.6719446e-19	-0.7181708e-11	-0.5676574e-21	0.4535706e-03	0.5656600e-
		TIME	0.1532091	0.1532091	1.072464	0.9958590	0.6894408	0.1532091
48	GLOBAL	MAXIMUM	-0.1324783e-02	0.2994389e-20	-0.7205830e-11	-0.2832265e-11	-0.1007072e-25	0.4861679e-
		TIME	0.1532091	0.1532091	1.072464	1.072464	0.9192544	0.1532091
49	GLOBAL	MAXIMUM	-0.1644301e-02	0.6466420e-19	-0.7237439e-11	-0.5735486e-20	0.4753157e-03	0.5520375e-
		TIME	0.1532091	0.1532091	1.072464	1.072464	0.6128363	0.1532091
50	GLOBAL	MAXIMUM	0.1850040e-02	0.1922770e-19	-0.7269049e-11	-0.2857113e-11	-0.1010168e-25	-0.6775017e-
		TIME	0.5362318	1.072464	1.072464	1.072464	0.9192544	0.5362318
51	GLOBAL	MAXIMUM	0.1917781e-02	-0.8216117e-19	-0.7308211e-11	0.5158939e-20	0.1557527e-03	-0.6645055e-
		TIME	0.6128363	0.6128363	1.072464	1.072464	2.834368	0.6128363
52	GLOBAL	MAXIMUM	-0.1865511e-02	-0.3557913e-20	-0.7347372e-11	-0.2887898e-11	-0.1014327e-25	0.6831826e-
		TIME	0.9958590	0.6128363	1.072464	1.072464	0.9192544	0.9958590
53	GLOBAL	MAXIMUM	-0.1704802e-02	0.6980386e-19	-0.7394168e-11	0.4891167e-21	0.3808171e-03	0.5861188e-
		TIME	0.1532091	0.1532091	1.072464	0.9192544	0.9958590	0.1532091
54	GLOBAL	MAXIMUM	-0.1537374e-02	0.3295322e-20	-0.7440964e-11	-0.2924685e-11	-0.1019553e-25	0.5637260e-
		TIME	0.1532091	0.1532091	1.072464	1.072464	0.9192544	0.1532091
55	GLOBAL	MAXIMUM	-0.1705202e-02	-0.7389204e-19	-0.7495492e-11	-0.1072642e-19	-0.3359183e-03	0.5865021e-
		TIME	0.1532091	0.5362318	1.072464	0.9192544	0.9958590	0.1532091
56	GLOBAL	MAXIMUM	0.1795058e-02	0.4031567e-19	-0.7550019e-11	-0.2967549e-11	-0.1025852e-25	-0.6575844e-
		TIME	0.6128363	0.9192544	1.072464	1.072464	0.9192544	0.6128363
57	GLOBAL	MAXIMUM	0.1920221e-02	0.1522736e-18	-0.7612391e-11	0.2247918e-19	0.1889022e-03	-0.6697514e-
		TIME	0.6128363	0.9192544	1.072464	1.072464	1.838509	0.6128363
58	GLOBAL	MAXIMUM	-0.1926711e-02	-0.1196694e-18	-0.7674762e-11	-0.3016579e-11	-0.1033229e-25	0.7054466e-
		TIME	0.9958590	1.072464	1.072464	1.072464	0.9192544	0.9958590
59	GLOBAL	MAXIMUM	-0.1704066e-02	0.1449051e-18	-0.7745108e-11	0.1069309e-19	0.5275941e-03	0.5865149e-
		TIME	0.1532091	0.9192544	1.072464	0.9192544	0.9958590	0.1532091
60	GLOBAL	MAXIMUM	-0.1537097e-02	-0.8315804e-19	-0.7815454e-11	-0.3071879e-11	-0.1041692e-25	0.5636003e-
		TIME	0.1532091	1.072464	1.072464	1.072464	0.9192544	0.1532091
61	GLOBAL	MAXIMUM	-0.1646507e-02	-0.1641552e-18	-0.7893920e-11	0.2366100e-19	0.1424419e-03	0.5525388e-
		TIME	0.1532091	1.072464	1.072464	1.072464	1.838509	0.1532091
62	GLOBAL	MAXIMUM	-0.1476406e-02	-0.1683376e-18	-0.7972387e-11	-0.3133561e-11	-0.1051463e-25	0.5414773e-
		TIME	0.1532091	1.072464	1.072464	1.072464	0.9192544	0.1532091
63	GLOBAL	MAXIMUM	-0.1725628e-02	0.2449245e-18	-0.8059136e-11	0.2434543e-19	-0.5912765e-03	0.5997781e-
		TIME	0.1532091	0.9192544	1.072464	1.072464	1.608695	0.1532091
64	GLOBAL	MAXIMUM	-0.2043989e-02	-0.2559811e-18	-0.8145886e-11	-0.3201755e-11	-0.1062339e-25	0.7479236e-
		TIME	0.2298136	1.072464	1.072464	1.072464	0.9192544	0.2298136
65	GLOBAL	MAXIMUM	-0.2484160e-02	0.2882710e-18	-0.8241099e-11	-0.2259677e-19	-0.9625352e-03	0.7452548e-
		TIME	0.9192544	0.9192544	1.072464	1.072464	1.225673	0.9192544
66	GLOBAL	MAXIMUM	0.2445518e-02	-0.1746325e-18	-0.8336313e-11	-0.3276603e-11	0.1215269e-27	-0.9608285e-
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464

36	GLOBAL	MAXIMUM	0.2460418e-02	0.4111192e-23	-0.2023844e-06	-0.7979636e-07	0.1197034e-21	-0.9711004e-0
		TIME	1.072464	0.9192544	0.9192544	0.9192544	0.9192544	1.072464
38	GLOBAL	MAXIMUM	-0.1099496e-02	0.1272072e-23	-0.1575266e-26	-0.4773862e-27	-0.2607799e-26	0.4272322e-0
		TIME	0.8426499	0.8426499	0.9192544	0.9192544	0.9192544	0.8426499
39	GLOBAL	MAXIMUM	0.2453283e-02	-0.1135327e-20	-0.1687305e-21	-0.6652727e-22	-0.1195510e-21	-0.9682845e-0
		TIME	1.072464	1.072464	0.9192544	0.9192544	0.9192544	1.072464
42	GLOBAL	MAXIMUM	0.2445757e-02	-0.2522695e-21	0.1076845e-09	0.3929523e-10	0.7020010e-26	-0.9613091e-0
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			/----------TRANS----------//			----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
1	GLOBAL	MAXIMUM	-0.6945065	0.1213864e-18	0.1382031e-06	0.5432098e-07	0.	0.2709434
		TIME	0.6894408	0.6894408	1.072464	1.072464	0.	0.6894408
3	GLOBAL	MAXIMUM	0.7738854	0.1088491e-17	0.1383527e-06	0.5437979e-07	-0.6382326e-25	-0.2763207
		TIME	0.6894408	0.6894408	1.072464	1.072464	1.072464	0.6894408
5	GLOBAL	MAXIMUM	-0.5026124	-0.9688757e-18	0.1386521e-06	0.5449746e-07	-0.6395318e-25	0.1802047
		TIME	0.3064182	0.3064182	1.072464	1.072464	1.072464	0.3064182
11	GLOBAL	MAXIMUM	0.4555840	0.8595513e-18	0.1404529e-06	0.5520529e-07	-0.6474842e-25	-0.1629470
		TIME	0.6894408	0.6894408	1.072464	1.072464	1.072464	0.6894408
17	GLOBAL	MAXIMUM	0.4500022	0.1774540e-14	0.1436232e-06	0.5640708e-07	-0.5338218e-25	-0.1639551
		TIME	0.6894408	1.072464	1.072464	1.072464	1.072464	0.6894408
19	GLOBAL	MAXIMUM	-0.5388645	0.3029656e-14	0.1450177e-06	0.5699946e-07	-0.6678033e-25	0.1928137
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464
44	GLOBAL	MAXIMUM	-0.6972972	-0.1228772e-18	0.3756525e-08	0.1476509e-08	0.1620633e-24	0.2738673
		TIME	0.6894408	0.6894408	1.072464	1.072464	1.072464	0.6894408
24	GLOBAL	MAXIMUM	0.	0.	0.	0.4657510e-09	0.	0.2357809e-0
		TIME	0.	0.	0.	1.072464	0.	0.6894408
25	GLOBAL	MAXIMUM	0.6420385e-01	0.	0.	0.4662552e-09	0.	-0.2413942e-0
		TIME	0.6894408	0.	0.	1.072464	0.	0.6894408
26	GLOBAL	MAXIMUM	-0.4325935e-01	0.	0.	0.4672641e-09	0.	0.1550973e-0
		TIME	0.3064182	0.	0.	1.072464	0.	0.3064182
27	GLOBAL	MAXIMUM	0.3522984e-01	0.	0.	0.4687789e-09	0.	-0.1205862e-0
		TIME	27.50103	0.	0.	1.072464	0.	24.20703
28	GLOBAL	MAXIMUM	-0.3472137e-01	0.	0.	0.4708011e-09	0.	0.1181392e-0
		TIME	27.88405	0.	0.	1.072464	0.	27.88405
29	GLOBAL	MAXIMUM	0.4001145e-01	0.	0.	0.4733331e-09	0.	-0.1403854e-0
		TIME	0.6894408	0.	0.	1.072464	0.	0.6894408
30	GLOBAL	MAXIMUM	-0.3481003e-01	0.	0.	0.4763774e-09	0.	0.1184814e-0
		TIME	27.88405	0.	0.	1.072464	0.	27.88405
31	GLOBAL	MAXIMUM	-0.3583707e-01	0.	0.	0.4799374e-09	0.	0.1224034e-0
		TIME	1.838509	0.	0.	1.072464	0.	1.838509
32	GLOBAL	MAXIMUM	0.3235588e-01	0.	0.	0.5725852e-09	0.	-0.1665769e-0
		TIME	0.6894408	0.	0.	1.072464	0.	0.6894408
33	GLOBAL	MAXIMUM	-0.4637483e-01	0.	0.	0.4887164e-09	0.	0.1666176e-0
		TIME	1.072464	0.	0.	1.072464	0.	1.072464
34	GLOBAL	MAXIMUM	0.3511359e-01	0.	0.	0.4939448e-09	0.	-0.1364479e-0
		TIME	0.2298136	0.	0.	1.072464	0.	0.2298136
35	GLOBAL	MAXIMUM	0.	0.	0.	0.4997080e-09	0.	0.4936596e-0
		TIME	0.	0.	0.	1.072464	0.	1.072464
67	GLOBAL	MAXIMUM	0.	0.	0.	0.1265967e-10	0.	0.2351681e-0
		TIME	0.	0.	0.	1.072464	0.	0.6894408
68	GLOBAL	MAXIMUM	0.6277634e-01	0.	0.	0.1271897e-10	0.	-0.2399445e-0
		TIME	0.6894408	0.	0.	1.072464	0.	0.6894408
69	GLOBAL	MAXIMUM	-0.4312584e-01	0.	0.	0.1280470e-10	0.	0.1550466e-0
		TIME	0.3064182	0.	0.	1.072464	0.	0.3064182

70	GLOBAL	MAXIMUM	-0.3520903e-01	0.	0.	0.1291704e-10	0.	-0.1205371e-0
		TIME	27.88405	0.	0.	1.072464	0.	24.20703
71	GLOBAL	MAXIMUM	-0.3474112e-01	0.	0.	0.1305622e-10	0.	0.1181317e-0
		TIME	27.88405	0.	0.	1.072464	0.	27.88405
72	GLOBAL	MAXIMUM	0.3983354e-01	0.	0.	0.1322253e-10	0.	-0.1402197e-0
		TIME	0.6894408	0.	0.	1.072464	0.	0.6894408
73	GLOBAL	MAXIMUM	-0.3483073e-01	0.	0.	0.1341632e-10	0.	0.1184911e-0
		TIME	27.88405	0.	0.	1.072464	0.	29.41614
74	GLOBAL	MAXIMUM	-0.3573879e-01	0.	0.	0.1363798e-10	0.	0.1222921e-0
		TIME	1.838509	0.	0.	1.072464	0.	1.838509
75	GLOBAL	MAXIMUM	0.3938835e-01	0.	0.	0.1388799e-10	0.	-0.1384506e-0
		TIME	0.6894408	0.	0.	1.072464	0.	0.6894408
76	GLOBAL	MAXIMUM	-0.4602194e-01	0.	0.	0.1416686e-10	0.	0.1662927e-0
		TIME	1.072464	0.	0.	1.072464	0.	1.072464
77	GLOBAL	MAXIMUM	0.3456289e-01	0.	0.	0.1447517e-10	0.	-0.1358685e-0
		TIME	0.2298136	0.	0.	1.072464	0.	0.2298136
78	GLOBAL	MAXIMUM	0.	0.	0.	0.1481355e-10	0.	0.4876771e-0
		TIME	0.	0.	0.	1.072464	0.	1.072464
37	GLOBAL	MAXIMUM	0.	0.	-0.1332598e-06	-0.5823453e-08	0.	0.1387541e-0
		TIME	0.	0.	1.072464	1.072464	0.	1.072464
40	GLOBAL	MAXIMUM	0.	0.	-0.2083290e-24	-0.9103975e-26	0.	0.8582734e-0
		TIME	0.	0.	1.072464	1.072464	0.	0.6894408
41	GLOBAL	MAXIMUM	0.	0.	-0.1110961e-21	-0.4854898e-23	0.	0.1383407e-0
		TIME	0.	0.	1.072464	1.072464	0.	1.072464
43	GLOBAL	MAXIMUM	0.	0.	-0.4065312e-08	-0.1776541e-09	0.	0.4875457e-0
		TIME	0.	0.	1.072464	1.072464	0.	1.072464

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			TRANS			ROTATION		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	0.4983922	0.2934393e-17	0.1382779e-06	-0.2686403e-18	0.4078866	-0.1031053
		TIME	0.1532091	0.1532091	1.072464	0.6894408	0.6894408	0.1532091
4	GLOBAL	MAXIMUM	0.7221509	0.5829751e-17	0.1385024e-06	0.1077316e-18	-0.1234394	-0.1973065
		TIME	0.6894408	0.6894408	1.072464	0.7660454	0.6894408	0.6894408
6	GLOBAL	MAXIMUM	-0.4465736	-0.1855888e-15	0.1388768e-06	0.1009035e-15	-0.6413445e-01	0.1431447
		TIME	0.3064182	1.072464	1.072464	1.072464	0.6128363	0.3064182
7	GLOBAL	MAXIMUM	-0.3920365	-0.3640851e-15	0.1391016e-06	0.5467413e-07	-0.6415054e-25	-0.1405407
		TIME	27.88405	1.072464	1.072464	1.072464	1.072464	24.20703
8	GLOBAL	MAXIMUM	-0.3982321	-0.1853313e-15	0.1394016e-06	-0.1009453e-15	-0.1995322e-01	0.1390434
		TIME	27.88405	1.072464	1.072464	1.072464	0.6894408	27.88405
9	GLOBAL	MAXIMUM	-0.3853910	-0.7984834e-18	0.1397016e-06	0.5490999e-07	-0.6441553e-25	0.1378762
		TIME	27.88405	27.88405	1.072464	1.072464	1.072464	27.88405
10	GLOBAL	MAXIMUM	-0.4112511	-0.4330788e-17	0.1400773e-06	-0.5447153e-19	0.4435938e-01	-0.1427474
		TIME	27.88405	29.41614	1.072464	0.6894408	0.6894408	27.50103
12	GLOBAL	MAXIMUM	-0.4111806	0.3653495e-15	0.1409046e-06	-0.2051708e-15	-0.3769904e-01	0.1429753
		TIME	29.41614	1.072464	1.072464	1.072464	0.6894408	29.41614
13	GLOBAL	MAXIMUM	-0.3864958	0.7378399e-15	0.1413563e-06	0.5556035e-07	-0.6514956e-25	0.1382759
		TIME	27.88405	1.072464	1.072464	1.072464	1.072464	27.88405
14	GLOBAL	MAXIMUM	-0.3959476	0.1481815e-14	0.1418845e-06	-0.4148921e-15	-0.2161944e-01	0.1396798
		TIME	27.88405	1.072464	1.072464	1.072464	1.838509	27.88405
15	GLOBAL	MAXIMUM	-0.3985821	0.2231450e-14	0.1424127e-06	0.5597556e-07	-0.6561934e-25	0.1423933
		TIME	1.838509	1.072464	1.072464	1.072464	1.072464	1.838509
16	GLOBAL	MAXIMUM	0.3977790	0.1999704e-14	0.1430179e-06	0.1269194e-15	0.5158327e-01	-0.1419839
		TIME	27.50103	1.072464	1.072464	1.072464	1.302277	27.50103
18	GLOBAL	MAXIMUM	-0.5358206	0.2397813e-14	0.1443204e-06	-0.3486434e-15	0.3744782e-01	-0.1779937
		TIME	1.072464	1.072464	1.072464	1.072464	1.455486	0.6894408

20	GLOBAL	MAXIMUM	0.3857864	0.3809144e-14	0.1457934e-06	-0.4345180e-15	-0.1361747	0.1402236
		TIME	0.2298136	1.072464	1.072464	1.072464	1.225673	2.604554
21	GLOBAL	MAXIMUM	0.4374695	0.4593919e-14	0.1465691e-06	0.5760926e-07	-0.6747271e-25	-0.1571445
		TIME	0.2298136	1.072464	1.072464	1.072464	1.072464	0.2298136
22	GLOBAL	MAXIMUM	-1.079040	0.3838826e-14	0.1474242e-06	0.4154660e-15	-0.3876345	0.2978607
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464
23	GLOBAL	MAXIMUM	-1.459711	0.3098242e-14	0.1482792e-06	0.5828143e-07	-0.1222951e-22	0.5717067
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464
45	GLOBAL	MAXIMUM	0.4994031	-0.1207240e-16	0.3765323e-08	0.2682261e-18	0.4087198	-0.1030103
		TIME	0.1532091	0.1532091	1.072464	0.6894408	0.6894408	0.1532091
46	GLOBAL	MAXIMUM	0.7740942	-0.1088491e-17	0.3774121e-08	0.1483425e-08	-0.6063210e-23	-0.2793177
		TIME	0.6894408	0.6894408	1.072464	1.072464	1.072464	0.6894408
47	GLOBAL	MAXIMUM	0.7229173	-0.2343463e-16	0.3786840e-08	-0.1077312e-18	-0.1234875	-0.1984631
		TIME	0.6894408	0.6894408	1.072464	0.7660454	0.6894408	0.6894408
48	GLOBAL	MAXIMUM	-0.5031103	0.9688757e-18	0.3799560e-08	0.1493424e-08	-0.6075552e-23	0.1807628
		TIME	0.3064182	0.3064182	1.072464	1.072464	1.072464	0.3064182
49	GLOBAL	MAXIMUM	-0.4467800	0.1684762e-16	0.3816227e-08	0.2814532e-17	-0.6413511e-01	0.1432335
		TIME	0.3064182	0.3064182	1.072464	1.072464	0.6128363	0.3064182
50	GLOBAL	MAXIMUM	0.3918983	-0.9299788e-17	0.3832894e-08	0.1506526e-08	-0.6094301e-23	-0.1405733
		TIME	27.50103	1.072464	1.072464	1.072464	1.072464	24.20703
51	GLOBAL	MAXIMUM	-0.3982705	0.1660545e-16	0.3853544e-08	-0.2772697e-17	-0.1994720e-01	0.1389894
		TIME	27.88405	0.6128363	1.072464	1.072464	0.6894408	27.88405
52	GLOBAL	MAXIMUM	-0.3852871	0.7984834e-18	0.3874194e-08	0.1522759e-08	-0.6119475e-23	0.1377874
		TIME	27.88405	27.88405	1.072464	1.072464	1.072464	27.88405
53	GLOBAL	MAXIMUM	-0.4113020	0.1699704e-16	0.3898869e-08	0.5447153e-19	0.4442973e-01	0.1427808
		TIME	27.88405	29.41614	1.072464	0.6894408	0.6894408	29.41614
54	GLOBAL	MAXIMUM	0.4558085	-0.8595513e-18	0.3923544e-08	0.1542156e-08	-0.6151100e-23	-0.1634595
		TIME	0.6894408	0.6894408	1.072464	1.072464	1.072464	0.6894408
55	GLOBAL	MAXIMUM	-0.4112327	0.2578123e-16	0.3952295e-08	-0.5752531e-17	-0.3775849e-01	0.1430145
		TIME	29.41614	1.072464	1.072464	1.072464	0.6894408	29.41614
56	GLOBAL	MAXIMUM	-0.3864316	0.2148384e-16	0.3981047e-08	0.1564758e-08	-0.6189208e-23	0.1382066
		TIME	29.41614	1.072464	1.072464	1.072464	1.072464	29.41614
57	GLOBAL	MAXIMUM	-0.3959697	0.5582530e-16	0.4013935e-08	-0.1184034e-16	-0.2162481e-01	0.1396322
		TIME	27.88405	1.072464	1.072464	1.072464	1.838509	27.88405
58	GLOBAL	MAXIMUM	-0.3985677	0.6410905e-16	0.4046823e-08	0.1590611e-08	-0.6233838e-23	0.1425905
		TIME	1.838509	1.072464	1.072464	1.072464	1.072464	1.838509
59	GLOBAL	MAXIMUM	0.3978002	0.6918072e-16	0.4083916e-08	0.5601385e-17	0.5155541e-01	-0.1404632
		TIME	27.50103	1.072464	1.072464	1.072464	1.302277	27.50103
60	GLOBAL	MAXIMUM	0.4501988	0.4394400e-16	0.4121008e-08	0.1619770e-08	-0.6285034e-23	-0.1614633
		TIME	0.6894408	1.072464	1.072464	1.072464	1.072464	0.6894408
61	GLOBAL	MAXIMUM	-0.5360500	0.8610135e-16	0.4162383e-08	-0.1246267e-16	0.3752362e-01	-0.1771918
		TIME	1.072464	1.072464	1.072464	1.072464	1.455486	0.6894408
62	GLOBAL	MAXIMUM	-0.5392650	0.8880957e-16	0.4203757e-08	0.1652295e-08	-0.6344131e-23	0.1937907
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464
63	GLOBAL	MAXIMUM	0.3858723	0.1242124e-15	0.4249499e-08	-0.1290860e-16	-0.1364302	0.1398225
		TIME	0.2298136	1.072464	1.072464	1.072464	1.225673	2.604554
64	GLOBAL	MAXIMUM	0.4374709	0.1352805e-15	0.4295242e-08	0.1688253e-08	-0.6409908e-23	-0.1582619
		TIME	0.2298136	1.072464	1.072464	1.072464	1.072464	0.2298136
65	GLOBAL	MAXIMUM	-1.080448	0.1471137e-15	0.4345447e-08	0.1197922e-16	-0.3841659	0.2946427
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464
66	GLOBAL	MAXIMUM	-1.446577	0.9215521e-16	0.4395652e-08	0.1727719e-08	-0.6407989e-25	0.5683751
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464
36	GLOBAL	MAXIMUM	-1.455579	0.2469786e-20	-0.1218460e-03	-0.4804159e-04	0.7206773e-19	0.5745014
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464
38	GLOBAL	MAXIMUM	-0.6959746	-0.7815397e-21	-0.9465710e-24	-0.2868594e-24	-0.1570032e-23	0.2704354
		TIME	0.6894408	0.8426499	1.072464	1.072464	1.072464	0.6894408
39	GLOBAL	MAXIMUM	-1.451243	0.6716132e-18	-0.1015806e-18	-0.4005133e-19	-0.7197594e-19	0.5727898
		TIME	1.072464	1.072464	1.072464	1.072464	1.072464	1.072464
42	GLOBAL	MAXIMUM	-1.446703	0.1492281e-18	-0.5678093e-07	-0.2071997e-07	-0.3701579e-23	0.5686292

```
                    TIME       1.072464        1.072464        1.072464        1.072464        1.072464        1.072464
 (  172) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  172) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  172) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  172) > $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  172) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:37:53.2          Elapsed time: 1:1:33.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 764 out of 942 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 855 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  14 pools of 524288 bytes total 7340032 bytes (5521%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 2, R_Get 70, R_Put 1, R_Del 1
 B_Read 4, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```

DYNAMIC LOADING 3 WIND SPECTRUM

**** ACTIVE UNITS - LENGTH WEIGHT ANGLE TEMPERATURE TIME
**** ASSUMED TO BE INCH POUND RADIAN FAHRENHEIT SECOND

(2) > units m n
(3) > type space frame
(4) > generate 23 joints id 1, 1 z 0.0 1.8 y 3.8 0.0 x 0.0 0.0

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
1	0.000	3.800	0.000
2	0.000	3.800	1.800
3	0.000	3.800	3.600
4	0.000	3.800	5.400
5	0.000	3.800	7.200
6	0.000	3.800	9.000
7	0.000	3.800	10.800
8	0.000	3.800	12.600
9	0.000	3.800	14.400
10	0.000	3.800	16.200
11	0.000	3.800	18.000
12	0.000	3.800	19.800
13	0.000	3.800	21.600
14	0.000	3.800	23.400
15	0.000	3.800	25.200
16	0.000	3.800	27.000
17	0.000	3.800	28.800
18	0.000	3.800	30.600
19	0.000	3.800	32.400
20	0.000	3.800	34.200
21	0.000	3.800	36.000
22	0.000	3.800	37.800
23	0.000	3.800	39.600

(5) > repeat 1 id 43 x 14.4

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
44	14.400	3.800	0.000
45	14.400	3.800	1.800
46	14.400	3.800	3.600
47	14.400	3.800	5.400
48	14.400	3.800	7.200
49	14.400	3.800	9.000
50	14.400	3.800	10.800
51	14.400	3.800	12.600
52	14.400	3.800	14.400
53	14.400	3.800	16.200
54	14.400	3.800	18.000
55	14.400	3.800	19.800
56	14.400	3.800	21.600
57	14.400	3.800	23.400
58	14.400	3.800	25.200
59	14.400	3.800	27.000
60	14.400	3.800	28.800
61	14.400	3.800	30.600
62	14.400	3.800	32.400
63	14.400	3.800	34.200
64	14.400	3.800	36.000
65	14.400	3.800	37.800
66	14.400	3.800	39.600

(6) > generate 12 joints id 24,1 z 0.0 3.6 x 0.0 0.0 y 0.0 0.0

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
24	0.000	0.000	0.000
25	0.000	0.000	3.600
26	0.000	0.000	7.200
27	0.000	0.000	10.800
28	0.000	0.000	14.400
29	0.000	0.000	18.000
30	0.000	0.000	21.600
31	0.000	0.000	25.200
32	0.000	0.000	28.800
33	0.000	0.000	32.400
34	0.000	0.000	36.000
35	0.000	0.000	39.600

(7) > repeat 1 id 43 x 14.4

/------- CARTESIAN COORDINATES FREE, GLOBAL -------/

JOINT	X	Y	Z
67	14.400	0.000	0.000
68	14.400	0.000	3.600
69	14.400	0.000	7.200
70	14.400	0.000	10.800
71	14.400	0.000	14.400
72	14.400	0.000	18.000
73	14.400	0.000	21.600
74	14.400	0.000	25.200
75	14.400	0.000	28.800
76	14.400	0.000	32.400
77	14.400	0.000	36.000
78	14.400	0.000	39.600

```
{    8} > status support 24 to 35, 67 to 78, 1 3 5 11 17 19 44
{    9} > joints coordinates
{   10} > 36 3.6 3.8 39.6 F
{   11} > 37 3.6 0.0 39.6 S
{   12} > 38 7.2 3.8 0.0 F
{   13} > 39 7.2 3.8 39.6 F
{   14} > 40 7.2 0.0 0.0 S
{   15} > 41 7.2 0.0 39.6 S
{   16} > 42 10.8 3.8 39.6 F
{   17} > 43 10.8 0.0 39.6 S
{   18} > member incidences
{   19} > 'b1' 1 2
{   20} > 'b2' 2 3
{   21} > 'b3' 3 4
{   22} > 'b4' 4 5
{   23} > 'b5' 5 6
{   24} > 'b6' 6 7
{   25} > 'b7' 7 8
{   26} > 'b8' 8 9
{   27} > 'b9' 9 10
{   28} > 'b10' 10 11
{   29} > 'b11' 11 12
{   30} > 'b12' 12 13
{   31} > 'b13' 13 14
{   32} > 'b14' 14 15
{   33} > 'b15' 15 16
{   34} > 'b16' 16 17
{   35} > 'b17' 17 18
{   36} > 'b18' 18 19
{   37} > 'b19' 19 20
{   38} > member incidences
{   39} > 'b20' 20 21
{   40} > 'b21' 21 22
{   41} > 'b22' 22 23
{   42} > 'ba23'  1 38
{   43} > 'ba24' 38 44
{   44} > 'bb25'  2 45
{   45} > 'bb26'  3 46
{   46} > 'bb27'  4 47
{   47} > 'bb28'  5 48
{   48} > 'bb29'  6 49
{   49} > 'bb30'  7 50
{   50} > 'bb31'  8 51
{   51} > 'bb32'  9 52
{   52} > 'bb33' 10 53
{   53} > 'bb34' 11 54
{   54} > 'bb35' 12 55
{   55} > 'bb36' 13 56
{   56} > 'bb37' 14 57
{   57} > 'bb38' 15 58
{   58} > 'bb39' 16 59
{   59} > 'bb40' 17 60
{   60} > 'bb41' 18 61
{   61} > member incidences
{   62} > 'bb42' 19 62
{   63} > 'bb43' 20 63
{   64} > 'bb44' 21 64
{   65} > 'bb45' 22 65
{   66} > 'bc46' 23 36
{   67} > 'bc47' 36 39
{   68} > 'bc48' 39 42
{   69} > 'bc49' 42 66
{   70} > 'bd50' 44 45
{   71} > 'bd51' 45 46
{   72} > 'bd52' 46 47
{   73} > 'bd53' 47 48
{   74} > 'bd54' 48 49
{   75} > 'bd55' 49 50
{   76} > 'bd56' 50 51
{   77} > 'bd57' 51 52
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(   78) > 'bd58' 52 53
(   79) > 'bd59' 53 54
(   80) > 'bd60' 54 55
(   81) > 'bd61' 55 56
(   82) > 'bd62' 56 57
(   83) > 'bd63' 57 58
(   84) > 'bd64' 58 59
(   85) > 'bd65' 59 60
(   86) > 'bd66' 60 61
(   87) > 'bd67' 61 62
(   88) > 'bd68' 62 63
(   89) > 'bd69' 63 64
(   90) > 'bd70' 64 65
(   91) > member incidences
(   92) > 'bd71' 65 66
(   93) > 's72'  24  1
(   94) > 's73'  25  3
(   95) > 's74'  26  5
(   96) > 's75'  27  7
(   97) > 's76'  28  9
(   98) > 's77'  29 11
(   99) > 's78'  30 13
(  100) > 's79'  31 15
(  101) > 's80'  32 17
(  102) > 's81'  33 19
(  103) > 's82'  34 21
(  104) > 's83'  35 23
(  105) > 's84'  37 36
(  106) > 's85'  40 38
(  107) > 's86'  41 39
(  108) > 's87'  43 42
(  109) > 's88'  67 44
(  110) > 's89'  68 46
(  111) > 's90'  69 48
(  112) > 's91'  70 50
(  113) > 's92'  71 52
(  114) > 's93'  72 54
(  115) > 's94'  73 56
(  116) > 's95'  74 58
(  117) > 's96'  75 60
(  118) > 's97'  76 62
(  119) > 's98'  77 64
(  120) > 's99'  78 66
(  121) >
(  121) > joint releases
(  122) > 25 to 34 kfx 1.15E7
(  123) > 68 to 77 kfx 1.15E7
(  124) > 40 37 41 43 kfz 1.15E7
(  125) > 1 for y for z mom x mom y mom z kfx  3.2574E6
(  126) > 3 for y for z mom x mom y mom z kfx 7.0822E5
(  127) > 5 for y for z mom x mom y mom z kfx 2.1247E6
(  128) > 11 for y for z mom x mom y mom z kfx 7.0822E5
(  129) > 17 for y for z mom x mom y mom z kfx 7.0822E5
(  130) > 19 for y for z mom x mom y mom z kfx 1.11225E6
(  131) > 44 for x for y mom x mom y mom z kfz 1.11225E6
(  132) > 24 to 35 mom kmx       1.0E9 kmz 1.0E9
(  133) > 67 to 78 mom kmx 1.0E9 kmz 1.0E9
(  134) >
(  134) > 37 41 40 43 mom   kmx 1.0E9 kmz 1.0E9
(  135) >
(  135) > member releases
(  136) > 'bb25' to 'bb45' start          moment x y z end moment y z
(  137) > 'b1' to 'b21' by 2 'bd50' to 'bd70' by 2 start mom z y
(  138) > 'b2' to 'b22' by 2 'bd51' to 'bd71' by 2 end mom z y
(  139) > 'ba23' 'ba24' start mom x y z end mom z y
(  140) > 'bc46' 'bc47' 'bc48' 'bc49' start mom x y z end mom y z
(  141) > member eccentricities
(  142) > 'bb25' to 'bb45' start x 0.15
(  143) > member properties prismatic
(  144) > 'b1' to 'b22' ax 14.75E-3 ix 3.038E-6 iz 3.5736E-4 iy 5.613E-5
(  145) > 'ba23' 'ba24' ax 25.0E-3 ix 7.3276E-6 iz 6.88E-4 iy 2.463E-4
(  146) > 'bb25' to 'bb45' ax 360.0E-3 ix 26.0E-3 iz 101.078E-3 iy 6.9E-3
(  147) > 'bc46' 'bc47' 'bc48' 'bc49' ax 3.877E-3 ix 8.74E-8 iz 1.673E-5 iy 6.156E-6
(  148) > 'bd50' to 'bd71' ax 7.684E-3 ix 3.054E-7 iz 7.763E-5 iy 2.769E-5
(  149) > 's72' to 's79' 's81' to 's83' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  150) > 's87' to 's99' ax 966.95E-4 iy 6.62E-4 iz 6.62E-4 ix 1.078E-3
(  151) > 's85' ax 187.492E-3 ix 4.0938E-3 iy 2.509E-3 iz 2.509E-3
(  152) > 's80' ax 105.54E-3 ix 1.336E-3 iy 7.85E-4 iz 7.85E-4
(  153) > 's84' 's86' ax 1.616E-3 ix 3.2E-6 iy 1.152E-6 iz 2.2956E-6
(  154) > material constants
(  155) > material concrete 's72' to 's79' 's81' to 's83' 's87' to 's99'
(  156) > material concrete 's85' 's80' 'bb25' to 'bb45'
(  157) > material steel 's84' 's86' 'b1' to 'b22' 'ba23' 'ba24' 'bc46' to 'bc49'
(  158) > material steel 'bd50' to 'bd71'
(  159) > constants beta 0.0 all
(  160) > dead load 'dl' direction -y all members
(  161) > damping percents 2.5 50
(  162) > inertia of joints lumped
```

```
{  163} > dynamic degrees of freedom with static condensation
{  164} > generate  70 from joints translations x
{  165} >
{  165} >   dynamic loading 3
{  166} >   joints  44 to 66 force x 0.0 610.0 340.0 340.0 610.0 340.0 610.0
{  167} >   340.0 340.0 610.0 340.0 610.0 340.0 610.0 340.0 340.0 0.0
{  168} >   time points 0.0 0.766 1.149 3.447 3.83 4.213 4.596 4.979 7.277 7.66
{  169} >   8.043 8.426 8.809 9.192 9.575 11.873 12.256
{  170} >
{  170} >   integrate from 0.0 to 20.0 at 0.0766
{  171} >    end of dynamic loading
{  172} >    dynamic analysis modal


 BANDWIDTH INFORMATION BEFORE RENUMBERING.


 THE MAXIMUM BANDWIDTH IS   72 AND OCCURS AT JOINT 38
 THE AVERAGE BANDWIDTH IS                      19.308
 THE STANDARD DEVIATION OF THE BANDWIDTH IS    16.383
                                              ----------
                                               35.690
                                              ==========



 BANDWIDTH INFORMATION AFTER  RENUMBERING.


 THE MAXIMUM BANDWIDTH IS    4 AND OCCURS AT JOINT 4
 THE AVERAGE BANDWIDTH IS                       2.551
 THE STANDARD DEVIATION OF THE BANDWIDTH IS     1.021
                                              ----------
                                                3.572
                                              ==========
0THE PSEUDO-DIAMETER OF THE STRUCTURE IS   28 BETWEEN JOINTS 41       AND 40


 TIME FOR CONSISTENCY CHECKS FOR   99 MEMBERS     0.45 SECONDS
 TIME FOR BANDWIDTH REDUCTION                     1.48 SECONDS
 TIME TO GENERATE   99 ELEMENT STIF. MATRICES    1.95 SECONDS
 TIME TO PROCESS     71 MEMBER RELEASES           3.53 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX            4.25 SECONDS
 TIME TO PROCESS   78 JOINTS                      4.06 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX        4.65 SECONDS
 TIME TO ASSEMBLE LUMPED MASS MATRIX              0.61 SECONDS
 TIME TO GENERATE REDUCED STIFFNESS MATRIX       10.35 SECONDS
 TIME FOR CONDENSATION                          238.35 SECONDS
 TIME TO TRANSFORM EIGENPROBLEM                   0.38 SECONDS
 TIME FOR TRIDIAGONALIZATION                     11.48 SECONDS
 TIME TO COMPUTE EIGENVALUES                      7.80 SECONDS
 TIME TO COMPUTE EIGENVECTORS                     5.33 SECONDS
 TIME TO TRANSFORM EIGENVECTORS                  10.48 SECONDS
 TIME TO NORMALIZE EIGENVECTORS                   1.16 SECONDS
 TIME TO TRANSFORM EIGENVECTORS TO JOINTS        96.81 SECONDS

 *************************
 * EIGEN-SOLUTION CHECKS *
 *************************


 MODE------EIGENVALUE-------FREQUENCY-------FREQUENCY--------PERIOD--------ESTIMATED---/
         ((RAD/SEC)**2)      (RAD/SEC)        (CYC/SEC)        (SEC/CYC)       ACCURACY

    1     6.727454d+01    8.202106d+00    1.305406d+00    7.660454d-01    1.682314d-10
    2     6.954759d+01    8.339520d+00    1.327276d+00    7.534229d-01    1.715818d-10
    3     7.757453d+01    8.807640d+00    1.401780d+00    7.133790d-01    5.332525d-11
    4     8.785211d+01    9.372946d+00    1.491751d+00    6.703533d-01    1.053954d-10
    5     9.546691d+01    9.770717d+00    1.555058d+00    6.430629d-01    9.126849d-11
    6     1.111998d+02    1.054513d+01    1.678310d+00    5.958377d-01    4.898725d-11
    7     1.195056d+02    1.093186d+01    1.739860d+00    5.747590d-01    4.387047d-11
    8     1.396344d+02    1.181670d+01    1.880686d+00    5.317208d-01    4.177525d-11
    9     1.677455d+02    1.295166d+01    2.061321d+00    4.851258d-01    1.219794d-12
   10     2.066677d+02    1.437594d+01    2.288002d+00    4.370625d-01    3.011305d-11
   11     4.878849d+02    2.208812d+01    3.515433d+00    2.844600d-01    2.553983d-11
   12     8.257434d+02    2.873575d+01    4.573437d+00    2.186539d-01    1.439964d-12
   13     1.399263d+03    3.740672d+01    5.953465d+00    1.679694d-01    1.660736d-12
   14     1.500251d+03    3.873308d+01    6.164561d+00    1.622176d-01    7.436474d-12
   15     1.649781d+03    4.061750d+01    6.464476d+00    1.546916d-01    7.459423d-12
   16     1.838761d+03    4.288077d+01    6.824687d+00    1.465269d-01    1.807695d-12
   17     2.046501d+03    4.523827d+01    7.199894d+00    1.388909d-01    4.440182d-13
   18     2.254418d+03    4.748071d+01    7.556789d+00    1.323313d-01    2.205616d-12
   19     2.446104d+03    4.945810d+01    7.871501d+00    1.270406d-01    3.810084d-12
   20     2.586623d+03    5.085885d+01    8.094437d+00    1.235416d-01    2.089889d-12
   21     2.674139d+03    5.171207d+01    8.230232d+00    1.215033d-01    2.045214d-12
   22     3.563408d+03    5.969429d+01    9.500641d+00    1.052561d-01    3.623298d-13
   23     4.780143d+03    6.913858d+01    1.100375d+01    9.087814d-02    1.458916d-12
```

24	2.609301d+04	1.615333d+02	2.570882d+01	3.889715d-02	2.697309d-13
25	2.806204d+04	1.675173d+02	2.666120d+01	3.750769d-02	2.082313d-13
26	2.806495d+04	1.675260d+02	2.666258d+01	3.750574d-02	9.168077d-14
27	2.806615d+04	1.675295d+02	2.666315d+01	3.750494d-02	2.829626d-13
28	2.806743d+04	1.675334d+02	2.666376d+01	3.750409d-02	3.578728d-13
29	2.806910d+04	1.675384d+02	2.666456d+01	3.750297d-02	1.466857d-13
30	2.807051d+04	1.675425d+02	2.666522d+01	3.750203d-02	1.053981d-13
31	2.807179d+04	1.675464d+02	2.666584d+01	3.750117d-02	1.463247d-13
32	2.807292d+04	1.675498d+02	2.666637d+01	3.750041d-02	1.607341d-13
33	2.807374d+04	1.675522d+02	2.666676d+01	3.749987d-02	1.679812d-13
34	2.807406d+04	1.675532d+02	2.666691d+01	3.749965d-02	1.305715d-13
35	2.807435d+04	1.675540d+02	2.666705d+01	3.749946d-02	2.593009d-14
36	2.808165d+04	1.675758d+02	2.667052d+01	3.749459d-02	1.360564d-13
37	2.809009d+04	1.676010d+02	2.667453d+01	3.748895d-02	3.735937d-13
38	2.809502d+04	1.676157d+02	2.667687d+01	3.748566d-02	6.679480d-14
39	2.811152d+04	1.676649d+02	2.668470d+01	3.747466d-02	2.474940d-13
40	2.812816d+04	1.677145d+02	2.669260d+01	3.746357d-02	4.049711d-13
41	2.813329d+04	1.677298d+02	2.669503d+01	3.746016d-02	4.483063d-13
42	2.814227d+04	1.677566d+02	2.669929d+01	3.745418d-02	3.331289d-13
43	2.815168d+04	1.677846d+02	2.670375d+01	3.744792d-02	4.425005d-13
44	1.654180d+05	4.067161d+02	6.473088d+01	1.544858d-02	7.358063d-15
45	1.854389d+05	4.306261d+02	6.853627d+01	1.459081d-02	2.068562d-14
46	1.856804d+05	4.309065d+02	6.858090d+01	1.458132d-02	1.131225d-14
47	1.858305d+05	4.310806d+02	6.860861d+01	1.457543d-02	3.493034d-15
48	1.859762d+05	4.312496d+02	6.863550d+01	1.456972d-02	1.694258d-14
49	1.860509d+05	4.313362d+02	6.864929d+01	1.456679d-02	4.757837d-14
50	1.862291d+05	4.315427d+02	6.868215d+01	1.455982d-02	1.535337d-14
51	1.864294d+05	4.317747d+02	6.871908d+01	1.455200d-02	2.755782d-14
52	1.865707d+05	4.319383d+02	6.874511d+01	1.454649d-02	2.613595d-14
53	1.866427d+05	4.320216d+02	6.875838d+01	1.454368d-02	4.159868d-14
54	1.867361d+05	4.321298d+02	6.877559d+01	1.454004d-02	3.714743d-14
55	1.997734d+05	4.469602d+02	7.113593d+01	1.405759d-02	5.838680d-15
56	1.997792d+05	4.469666d+02	7.113695d+01	1.405739d-02	4.240938d-14
57	1.997893d+05	4.469779d+02	7.113874d+01	1.405704d-02	5.490185d-15
58	1.998034d+05	4.469938d+02	7.114127d+01	1.405654d-02	3.172256d-14
59	1.998209d+05	4.470133d+02	7.114437d+01	1.405593d-02	3.351395d-14
60	1.998407d+05	4.470354d+02	7.114790d+01	1.405523d-02	1.987657d-14
61	1.998606d+05	4.470577d+02	7.115144d+01	1.405453d-02	3.267716d-14
62	1.998786d+05	4.470779d+02	7.115466d+01	1.405389d-02	4.501914d-14
63	1.998935d+05	4.470945d+02	7.115731d+01	1.405337d-02	3.941547d-14
64	1.999040d+05	4.471063d+02	7.115917d+01	1.405300d-02	2.530871d-14
65	1.999602d+05	4.471691d+02	7.116917d+01	1.405103d-02	1.422803d-14
66	5.699654d+05	7.549605d+02	1.201557d+02	8.322535d-03	3.236656d-15
67	7.990174d+05	8.938777d+02	1.422651d+02	7.029133d-03	7.997394d-15
68	1.181481d+06	1.086959d+03	1.729950d+02	5.780515d-03	1.678443d-14
69	2.050067d+06	1.431805d+03	2.278789d+02	4.388296d-03	5.162275d-15
70	4.976748d+06	2.230863d+03	3.550528d+02	2.816482d-03	2.704014d-15

ORTHOGONALITY CHECK

WITH RESPECT TO MASS

OFF DIAGONALS: MAXIMUM = 0.5173e-12
MINIMUM = 0.4254e-34
MEAN = 0.8522e-15

DIAGONALS: MAXIMUM = 0.1000e+01
MINIMUM = 0.1000e+01
MEAN = 0.1000e+01

WITH RESPECT TO STIFFNESS

OFF DIAGONALS: MAXIMUM = 0.1137e-08
MINIMUM = 0.1982e-27
MEAN = 0.1596e-10

DIAGONALS: MAXIMUM = 0.4977e+07
MINIMUM = 0.6727e+02
MEAN = 0.2056e+06

****
* END OF EIGEN-SOLUTION CHECKS *
****

```
 TIME TO CHECK EIGENSOLUTION                    49.83 SECONDS
 TIME TO COMPUTE TIME HISTORY RESPONSE        1073.95 SECONDS
 (  173) >  list dynamic max dis max acc times all joints all
1


    ****************************
    *RESULTS OF LATEST ANALYSES*
    ****************************


     PROBLEM - test1      TITLE - NONE GIVEN

     ACTIVE UNITS  M    N    RAD  DEGF SEC


 ================================================================================================================================
  LOADING -  111
 ================================================================================================================================


      MAXIMUM JOINT DISPLACEMENTS AT THE SUPPORTED JOINTS

JOINT                        /----------------------TRANS----------------------//----------------------ROTATION---------------
                               X-TRANS          Y-TRANS          Z-TRANS          X-ROTATION       Y-ROTATION       Z-ROTATIO

1         GLOBAL    MAXIMUM  0.1284812e-03    0.2198493e-21    0.2092481e-10    0.8224534e-11          0.         -0.5136579e-
                    TIME     4.596000         4.596000         8.962200         8.962200               0.          4.596000

3         GLOBAL    MAXIMUM  0.7841282e-03    0.1367853e-20    0.2094746e-10    0.8233437e-11    0.2378162e-28    -0.2844117e-
                    TIME     4.596000         4.596000         8.962200         8.962200         9.268600          4.596000

5         GLOBAL    MAXIMUM  0.4156078e-03    0.1259440e-20    0.2099279e-10    0.8251254e-11    0.2394333e-28    -0.1536400e-
                    TIME     9.268600         9.345200         8.962200         8.962200         9.268600          9.268600

11        GLOBAL    MAXIMUM  0.1027904e-02    0.2624680e-20    0.2126545e-10    0.8358423e-11    0.2473071e-28    -0.3779952e-
                    TIME     9.345200         9.345200         8.962200         8.962200         9.268600          9.345200

17        GLOBAL    MAXIMUM  0.7520467e-03    0.2687314e-18    0.2174544e-10    0.8540381e-11    0.2096619e-28    -0.2721034e-
                    TIME     9.345200         8.962200         8.962200         8.962200         9.268600          9.345200

19        GLOBAL    MAXIMUM  0.6378684e-03    0.4590508e-18    0.2195657e-10    0.8630071e-11    0.2650916e-28    -0.2340390e-
                    TIME     9.268600         8.962200         8.962200         8.962200         9.268600          9.268600

44        GLOBAL    MAXIMUM  0.1297455e-03   -0.2194028e-21    0.5636472e-10    0.2215426e-10    0.2431677e-26    -0.5108452e-
                    TIME     4.596000         4.596000         4.596000         4.596000         4.596000          4.596000

24        GLOBAL    MAXIMUM        0.               0.               0.         0.7051759e-13          0.         -0.4256254e-
                    TIME           0.               0.               0.         8.962200               0.          4.596000

25        GLOBAL    MAXIMUM  0.5698051e-04          0.               0.         0.7059393e-13          0.         -0.2462381e-
                    TIME     4.596000               0.               0.         8.962200               0.          4.596000

26        GLOBAL    MAXIMUM  0.2888706e-04          0.               0.         0.7074669e-13          0.         -0.1289336e-
                    TIME     9.268600               0.               0.         8.962200               0.          9.268600

27        GLOBAL    MAXIMUM  0.1319499e-03          0.               0.         0.7097603e-13          0.         -0.5725829e-
                    TIME     9.345200               0.               0.         8.962200               0.          9.345200

28        GLOBAL    MAXIMUM  0.1393971e-03          0.               0.         0.7128221e-13          0.         -0.6057588e-
                    TIME     9.345200               0.               0.         8.962200               0.          9.345200

29        GLOBAL    MAXIMUM  0.7237209e-04          0.               0.         0.7166556e-13          0.         -0.3199605e-
                    TIME     9.345200               0.               0.         8.962200               0.          9.345200

30        GLOBAL    MAXIMUM  0.1411230e-03          0.               0.         0.7212649e-13          0.         -0.6132365e-
                    TIME     9.421800               0.               0.         8.962200               0.          9.421800

31        GLOBAL    MAXIMUM  0.1392665e-03          0.               0.         0.7266550e-13          0.         -0.6047605e-
                    TIME     9.345200               0.               0.         8.962200               0.          9.345200

32        GLOBAL    MAXIMUM  0.6220297e-04          0.               0.         0.8669295e-13          0.         -0.2738437e-
                    TIME     9.345200               0.               0.         8.962200               0.          9.345200

33        GLOBAL    MAXIMUM  0.4513683e-04          0.               0.         0.7399469e-13          0.         -0.1988482e-
                    TIME     9.268600               0.               0.         8.962200               0.          9.268600

34        GLOBAL    MAXIMUM  0.9931070e-04          0.               0.         0.7478631e-13          0.         -0.4295227e-
                    TIME     9.268600               0.               0.         8.962200               0.          9.268600
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35	GLOBAL	MAXIMUM	0.	0.	0.	0.7565889e-13	0.	-0.1337395e-0
		TIME	0.	0.	0.	8.962200	0.	9.268600
67	GLOBAL	MAXIMUM	0.	0.	0.	0.1899518e-12	0.	-0.4365017e-0
		TIME	0.	0.	0.	4.596000	0.	4.596000
68	GLOBAL	MAXIMUM	0.5634489e-04	0.	0.	0.1908415e-12	0.	-0.2456229e-0
		TIME	4.596000	0.	0.	4.596000	0.	4.596000
69	GLOBAL	MAXIMUM	0.2975754e-04	0.	0.	0.1921279e-12	0.	-0.1301974e-0
		TIME	9.268600	0.	0.	4.596000	0.	9.268600
70	GLOBAL	MAXIMUM	0.1310882e-03	0.	0.	0.1938135e-12	0.	-0.5715446e-0
		TIME	9.345200	0.	0.	4.596000	0.	9.345200
71	GLOBAL	MAXIMUM	0.1387290e-03	0.	0.	0.1959018e-12	0.	-0.6049490e-0
		TIME	9.345200	0.	0.	4.596000	0.	9.345200
72	GLOBAL	MAXIMUM	0.7360616e-04	0.	0.	0.1983972e-12	0.	-0.3215995e-0
		TIME	9.345200	0.	0.	4.596000	0.	9.345200
73	GLOBAL	MAXIMUM	0.1404523e-03	0.	0.	0.2013049e-12	0.	-0.6124095e-0
		TIME	9.421800	0.	0.	4.596000	0.	9.421800
74	GLOBAL	MAXIMUM	0.1384826e-03	0.	0.	0.2046310e-12	0.	-0.6038109e-0
		TIME	9.345200	0.	0.	4.596000	0.	9.345200
75	GLOBAL	MAXIMUM	0.5387615e-04	0.	0.	0.2083822e-12	0.	-0.2353799e-0
		TIME	9.345200	0.	0.	4.596000	0.	9.345200
76	GLOBAL	MAXIMUM	0.4571339e-04	0.	0.	0.2125665e-12	0.	-0.1997178e-0
		TIME	9.268600	0.	0.	4.596000	0.	9.268600
77	GLOBAL	MAXIMUM	0.9822562e-04	0.	0.	0.2171924e-12	0.	-0.4282414e-0
		TIME	9.268600	0.	0.	4.596000	0.	9.268600
78	GLOBAL	MAXIMUM	0.	0.	0.	0.2222698e-12	0.	-0.1353290e-0
		TIME	0.	0.	0.	4.596000	0.	9.268600
37	GLOBAL	MAXIMUM	0.	0.	-0.2017636e-10	-0.8817068e-12	0.	-0.3813368e-0
		TIME	0.	0.	8.962200	8.962200	0.	9.268600
40	GLOBAL	MAXIMUM	0.	0.	-0.1028580e-27	-0.4494895e-29	0.	-0.1588637e-0
		TIME	0.	0.	0.7660000	0.7660000	0.	4.596000
41	GLOBAL	MAXIMUM	0.	0.	-0.1748105e-25	-0.7639217e-27	0.	-0.3813927e-0
		TIME	0.	0.	8.962200	8.962200	0.	9.268600
43	GLOBAL	MAXIMUM	0.	0.	-0.6099792e-10	-0.2665609e-11	0.	-0.1348655e-0
		TIME	0.	0.	4.596000	4.596000	0.	9.268600

MAXIMUM JOINT DISPLACEMENTS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	0.5052625e-03	0.4945333e-20	0.2093613e-10	-0.3188900e-21	0.1821242e-03	-0.1678887e-0
		TIME	4.596000	4.596000	8.962200	4.596000	4.596000	4.596000
4	GLOBAL	MAXIMUM	0.6344783e-03	0.6445059e-20	0.2097012e-10	0.1425446e-21	-0.1105522e-03	-0.2132354e-0
		TIME	4.596000	4.596000	8.962200	5.208800	4.596000	4.596000
6	GLOBAL	MAXIMUM	0.1184435e-02	-0.3008233e-19	0.2102681e-10	0.1559905e-19	0.3932727e-03	-0.4083356e-0
		TIME	9.345200	8.962200	8.962200	8.962200	9.345200	9.345200
7	GLOBAL	MAXIMUM	0.1826556e-02	-0.5606059e-19	0.2106084e-10	0.8278002e-11	0.2415511e-28	-0.6643123e-0
		TIME	9.345200	8.962200	8.962200	8.962200	9.268600	9.345200
8	GLOBAL	MAXIMUM	0.1974847e-02	-0.3473069e-19	0.2110627e-10	-0.1523348e-19	-0.7702986e-04	-0.6840556e-0
		TIME	9.345200	9.728200	8.962200	8.962200	10.57080	9.345200
9	GLOBAL	MAXIMUM	0.1933451e-02	0.3777619e-20	0.2115170e-10	0.8313713e-11	0.2441739e-28	-0.7037989e-0
		TIME	9.345200	9.345200	8.962200	8.962200	9.268600	9.345200
10	GLOBAL	MAXIMUM	0.1559188e-02	0.1650609e-19	0.2120857e-10	0.3202610e-21	-0.2524181e-03	-0.5408970e-0
		TIME	9.345200	9.345200	8.962200	9.345200	9.421800	9.345200
12	GLOBAL	MAXIMUM	0.1559647e-02	0.5377411e-19	0.2133383e-10	-0.3087036e-19	0.2641573e-03	-0.5413745e-0
		TIME	9.421800	4.366200	8.962200	8.962200	9.421800	9.421800
13	GLOBAL	MAXIMUM	0.1957369e-02	0.1105474e-18	0.2140222e-10	0.8412181e-11	0.2509575e-28	-0.7125223e-0
		TIME	9.421800	8.962200	8.962200	8.962200	9.268600	9.421800

14	GLOBAL	MAXIMUM	0.2028306e-02	0.2177026e-18	0.2148219e-10	-0.6284033e-19	0.6590127e-04	-0.7029743e-0
		TIME	9.345200	8.962200	8.962200	8.962200	11.33680	9.345200
15	GLOBAL	MAXIMUM	0.1929767e-02	0.3367724e-18	0.2156216e-10	0.8475046e-11	0.2551325e-28	-0.7021672e-0
		TIME	9.345200	8.962200	8.962200	8.962200	9.268600	9.345200
16	GLOBAL	MAXIMUM	0.1413929e-02	0.3000135e-18	0.2165380e-10	0.1890028e-19	-0.3460085e-03	-0.4871355e-0
		TIME	9.345200	8.962200	8.962200	8.962200	9.421800	9.345200
18	GLOBAL	MAXIMUM	0.7240836e-03	0.3646340e-18	0.2185101e-10	-0.5286653e-19	-0.6091306e-04	-0.2460604e-0
		TIME	9.268600	8.962200	8.962200	8.962200	10.95380	9.268600
20	GLOBAL	MAXIMUM	0.1062836e-02	0.5777596e-18	0.2207402e-10	-0.6572679e-19	0.2028733e-03	-0.3652756e-0
		TIME	9.268600	8.962200	8.962200	8.962200	9.268600	9.268600
21	GLOBAL	MAXIMUM	0.1368212e-02	0.6956671e-18	0.2219147e-10	0.8722399e-11	0.2708965e-28	-0.4965123e-0
		TIME	9.268600	8.962200	8.962200	8.962200	9.268600	9.268600
22	GLOBAL	MAXIMUM	0.9428559e-03	0.5830773e-18	0.2232093e-10	0.6290114e-19	-0.2689431e-03	-0.3274979e-0
		TIME	9.268600	8.962200	8.962200	8.962200	9.268600	9.268600
23	GLOBAL	MAXIMUM	0.4000162e-03	0.4692229e-18	0.2245040e-10	0.8824169e-11	-0.1851623e-26	-0.1584833e-0
		TIME	9.268600	8.962200	8.962200	8.962200	8.962200	9.268600
45	GLOBAL	MAXIMUM	0.5059748e-03	-0.1990445e-19	0.5649673e-10	0.3190140e-21	0.1819673e-03	-0.1686371e-0
		TIME	4.596000	4.596000	4.596000	4.596000	4.596000	4.596000
46	GLOBAL	MAXIMUM	0.7848279e-03	-0.1367853e-20	0.5662874e-10	0.2225803e-10	0.2259254e-26	-0.2861897e-0
		TIME	4.596000	4.596000	4.596000	4.596000	9.268600	4.596000
47	GLOBAL	MAXIMUM	0.6351900e-03	-0.2540867e-19	0.5681959e-10	-0.1425434e-21	-0.1104889e-03	-0.2137730e-0
		TIME	4.596000	4.596000	4.596000	5.208800	4.596000	4.596000
48	GLOBAL	MAXIMUM	0.4165154e-03	-0.1259440e-20	0.5701044e-10	0.2240806e-10	0.2274616e-26	-0.1521828e-0
		TIME	9.268600	9.345200	4.596000	4.596000	9.268600	9.268600
49	GLOBAL	MAXIMUM	0.1185134e-02	-0.1093675e-18	0.5726053e-10	0.4185557e-19	0.3930462e-03	-0.4083459e-0
		TIME	9.345200	9.345200	4.596000	0.7660000	9.345200	9.345200
50	GLOBAL	MAXIMUM	0.1826593e-02	-0.1516197e-18	0.5751061e-10	0.2260465e-10	0.2294735e-26	-0.6662433e-0
		TIME	9.345200	4.596000	4.596000	4.596000	9.268600	9.345200
51	GLOBAL	MAXIMUM	0.1975676e-02	-0.1420644e-18	0.5782045e-10	-0.4172693e-19	-0.7701579e-04	-0.6857634e-0
		TIME	9.345200	9.345200	4.596000	4.596000	10.57080	9.345200
52	GLOBAL	MAXIMUM	0.1933457e-02	-0.3777619e-20	0.5813029e-10	0.2284822e-10	0.2319652e-26	-0.7052835e-0
		TIME	9.345200	9.345200	4.596000	4.596000	9.268600	9.345200
53	GLOBAL	MAXIMUM	0.1559945e-02	-0.6444879e-19	0.5850052e-10	-0.3202610e-21	-0.2522547e-03	-0.5404293e-0
		TIME	9.345200	9.345200	4.596000	9.345200	9.421800	9.345200
54	GLOBAL	MAXIMUM	0.1028515e-02	-0.2624680e-20	0.5887076e-10	0.2313926e-10	0.2349418e-26	-0.3755751e-0
		TIME	9.345200	9.345200	4.596000	4.596000	9.268600	9.345200
55	GLOBAL	MAXIMUM	0.1560362e-02	0.1466910e-18	0.5930216e-10	-0.8665229e-19	0.2639907e-03	-0.5408490e-0
		TIME	9.421800	9.038800	4.596000	4.596000	9.421800	9.421800
56	GLOBAL	MAXIMUM	0.1957318e-02	0.3107476e-18	0.5973356e-10	0.2347839e-10	0.2384096e-26	-0.7139848e-0
		TIME	9.421800	4.596000	4.596000	4.596000	9.268600	9.421800
57	GLOBAL	MAXIMUM	0.2029145e-02	0.6031190e-18	0.6022703e-10	-0.1776616e-18	0.6589021e-04	-0.7045109e-0
		TIME	9.345200	4.596000	4.596000	4.596000	11.33680	9.345200
58	GLOBAL	MAXIMUM	0.1929778e-02	0.9503288e-18	0.6072050e-10	0.2386630e-10	0.2423758e-26	-0.7039121e-0
		TIME	9.345200	4.596000	4.596000	4.596000	9.268600	9.345200
59	GLOBAL	MAXIMUM	0.1414661e-02	0.7718005e-18	0.6127706e-10	0.8484645e-19	-0.3458494e-03	-0.4893564e-0
		TIME	9.345200	0.7660000	4.596000	4.596000	9.421800	9.345200
60	GLOBAL	MAXIMUM	0.7526706e-03	0.6448817e-18	0.6183361e-10	0.2430382e-10	0.2468487e-26	-0.2748003e-0
		TIME	9.345200	4.596000	4.596000	4.596000	9.268600	9.345200
61	GLOBAL	MAXIMUM	0.7247526e-03	0.9619064e-18	0.6245441e-10	-0.1866679e-18	-0.6091598e-04	-0.2471023e-0
		TIME	9.268600	0.7660000	4.596000	4.596000	10.95380	9.268600
62	GLOBAL	MAXIMUM	0.6386163e-03	0.1316886e-17	0.6307522e-10	0.2479183e-10	0.2518370e-26	-0.2331513e-0
		TIME	9.268600	4.596000	4.596000	4.596000	9.268600	9.268600
63	GLOBAL	MAXIMUM	0.1063558e-02	0.1643223e-17	0.6376155e-10	-0.1948877e-18	0.2027128e-03	-0.3660809e-0
		TIME	9.268600	0.7660000	4.596000	4.596000	9.268600	9.268600
64	GLOBAL	MAXIMUM	0.1368382e-02	0.2018481e-17	0.6444789e-10	0.2533136e-10	0.2573517e-26	-0.4990106e-0
		TIME	9.268600	4.596000	4.596000	4.596000	9.268600	9.268600
65	GLOBAL	MAXIMUM	0.9435771e-03	0.1674568e-17	0.6520119e-10	0.1779087e-18	-0.2684712e-03	-0.3285500e-0
		TIME	9.268600	0.7660000	4.596000	4.596000	9.268600	9.268600

66	GLOBAL	MAXIMUM	0.4018853e-03	0.1378010e-17	0.6595449e-10	0.2592354e-10	-0.9614859e-27	-0.1580891e-
		TIME	9.268600	4.596000	4.596000	4.596000	4.596000	9.268600
36	GLOBAL	MAXIMUM	0.4000357e-03	0.3729396e-24	-0.1844824e-07	-0.7273794e-08	0.1091150e-22	-0.1578898e-
		TIME	9.268600	8.962200	8.962200	8.962200	8.962200	9.268600
38	GLOBAL	MAXIMUM	0.1288227e-03	-0.2302644e-24	-0.4673494e-27	-0.1416307e-27	-0.2377125e-27	-0.5005675e-
		TIME	4.596000	4.596000	0.7660000	0.7660000	8.962200	4.596000
39	GLOBAL	MAXIMUM	0.4000943e-03	-0.1850135e-21	-0.1598378e-22	-0.6302105e-23	-0.1089760e-22	-0.1579129e-
		TIME	9.268600	9.268600	8.962200	8.962200	8.962200	9.268600
42	GLOBAL	MAXIMUM	0.4001888e-03	-0.4147492e-22	-0.8519687e-09	-0.3108925e-09	-0.5554028e-25	-0.1572950e-
		TIME	9.268600	9.268600	4.596000	4.596000	4.596000	9.268600

MAXIMUM JOINT ACCELERATIONS AT THE SUPPORTED JOINTS

JOINT			/----------TRANS----------//			----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATIO
1	GLOBAL	MAXIMUM	0.6255846e-02	0.8555551e-20	-0.3051839e-06	-0.1199531e-06	0.	-0.2459949e-
		TIME	1.378800	4.289600	11.56660	11.56660	0.	1.378800
3	GLOBAL	MAXIMUM	0.3200413e-01	0.5329129e-19	-0.3055143e-06	-0.1200830e-06	0.4595486e-24	-0.1158949e-
		TIME	4.289600	4.289600	11.56660	11.56660	11.56660	4.289600
5	GLOBAL	MAXIMUM	-0.1200177e-01	-0.4189212e-19	-0.3061754e-06	-0.1203428e-06	0.4619830e-24	0.4445670e-
		TIME	4.672600	9.345200	11.56660	11.56660	11.56660	4.672600
11	GLOBAL	MAXIMUM	-0.4096554e-01	0.1146483e-18	-0.3101521e-06	-0.1219058e-06	0.4742059e-24	0.1511870e-
		TIME	9.421800	9.804800	11.56660	11.56660	11.56660	9.421800
17	GLOBAL	MAXIMUM	-0.2431536e-01	-0.3920399e-14	-0.3171527e-06	-0.1245597e-06	0.3985930e-24	0.8822713e-
		TIME	9.345200	11.56660	11.56660	11.56660	11.56660	9.345200
19	GLOBAL	MAXIMUM	-0.2013247e-01	-0.6692305e-14	-0.3202320e-06	-0.1258678e-06	0.5023485e-24	0.7409821e-
		TIME	9.268600	11.56660	11.56660	11.56660	11.56660	9.268600
44	GLOBAL	MAXIMUM	0.6223779e-02	-0.8340812e-20	0.6827387e-06	0.2683517e-06	0.2945459e-22	-0.2446272e-
		TIME	1.378800	4.289600	10.80060	10.80060	10.80060	1.378800
24	GLOBAL	MAXIMUM	0.	0.	0.	-0.1028484e-08	0.	-0.2107334e-
		TIME	0.	0.	0.	11.56660	0.	1.378800
25	GLOBAL	MAXIMUM	0.2335343e-02	0.	0.	-0.1029598e-08	0.	-0.1005963e-
		TIME	4.289600	0.	0.	11.56660	0.	4.289600
26	GLOBAL	MAXIMUM	0.8070681e-03	0.	0.	-0.1031826e-08	0.	0.3734432e-
		TIME	4.289600	0.	0.	11.56660	0.	4.672600
27	GLOBAL	MAXIMUM	-0.6104035e-02	0.	0.	-0.1035171e-08	0.	0.2619790e-
		TIME	9.345200	0.	0.	11.56660	0.	9.345200
28	GLOBAL	MAXIMUM	0.6740823e-02	0.	0.	-0.1039636e-08	0.	-0.2906413e-
		TIME	9.804800	0.	0.	11.56660	0.	9.804800
29	GLOBAL	MAXIMUM	-0.2872313e-02	0.	0.	-0.1045227e-08	0.	0.1273110e-
		TIME	9.345200	0.	0.	11.56660	0.	9.421800
30	GLOBAL	MAXIMUM	0.6908098e-02	0.	0.	-0.1051950e-08	0.	-0.2983470e-
		TIME	9.804800	0.	0.	11.56660	0.	9.804800
31	GLOBAL	MAXIMUM	0.6618505e-02	0.	0.	-0.1059811e-08	0.	-0.2864564e-
		TIME	9.728200	0.	0.	11.56660	0.	9.728200
32	GLOBAL	MAXIMUM	-0.2022214e-02	0.	0.	-0.1264398e-08	0.	0.8820095e-
		TIME	9.345200	0.	0.	11.56660	0.	9.345200
33	GLOBAL	MAXIMUM	-0.1391443e-02	0.	0.	-0.1079197e-08	0.	0.6278729e-
		TIME	9.268600	0.	0.	11.56660	0.	9.268600
34	GLOBAL	MAXIMUM	0.4107215e-02	0.	0.	-0.1090743e-08	0.	-0.1773991e-
		TIME	9.651600	0.	0.	11.56660	0.	9.651600
35	GLOBAL	MAXIMUM	0.	0.	0.	-0.1103469e-08	0.	-0.5219640e-
		TIME	0.	0.	0.	11.56660	0.	4.596000
67	GLOBAL	MAXIMUM	0.	0.	0.	0.2300862e-08	0.	-0.2097439e-
		TIME	0.	0.	0.	10.80060	0.	1.378800
68	GLOBAL	MAXIMUM	0.2298697e-02	0.	0.	0.2311639e-08	0.	-0.1006052e-
		TIME	4.289600	0.	0.	10.80060	0.	4.289600

69	GLOBAL	MAXIMUM	-0.8387822e-03	0.	0.	0.2327221e-08	0.	0.3659571e-
		TIME	4.672600	0.	0.	10.80060	0.	3.906600
70	GLOBAL	MAXIMUM	-0.6041370e-02	0.	0.	0.2347638e-08	0.	0.2663727e-
		TIME	9.345200	0.	0.	10.80060	0.	9.345200
71	GLOBAL	MAXIMUM	0.6683564e-02	0.	0.	0.2372934e-08	0.	-0.2930589e-
		TIME	9.804800	0.	0.	10.80060	0.	9.804800
72	GLOBAL	MAXIMUM	0.2922976e-02	0.	0.	0.2403161e-08	0.	0.1308418e-
		TIME	9.804800	0.	0.	10.80060	0.	9.345200
73	GLOBAL	MAXIMUM	0.6857816e-02	0.	0.	0.2438381e-08	0.	-0.3003601e-
		TIME	9.804800	0.	0.	10.80060	0.	9.804800
74	GLOBAL	MAXIMUM	0.6568248e-02	0.	0.	0.2478669e-08	0.	0.2872645e-
		TIME	9.728200	0.	0.	10.80060	0.	9.345200
75	GLOBAL	MAXIMUM	-0.1747184e-02	0.	0.	0.2524107e-08	0.	0.7743205e-
		TIME	9.345200	0.	0.	10.80060	0.	9.345200
76	GLOBAL	MAXIMUM	-0.1423051e-02	0.	0.	0.2574791e-08	0.	0.6080650e-
		TIME	9.268600	0.	0.	10.80060	0.	9.268600
77	GLOBAL	MAXIMUM	0.4049813e-02	0.	0.	0.2630825e-08	0.	-0.1760719e-
		TIME	9.651600	0.	0.	10.80060	0.	9.651600
78	GLOBAL	MAXIMUM	0.	0.	0.	0.2692325e-08	0.	-0.5940665e-
		TIME	0.	0.	0.	10.80060	0.	8.426000
37	GLOBAL	MAXIMUM	0.	0.	0.2942680e-06	0.1285951e-07	0.	-0.1838391e-
		TIME	0.	0.	11.56660	11.56660	0.	5.132200
40	GLOBAL	MAXIMUM	0.	0.	-0.6306598e-24	-0.2755983e-25	0.	-0.8727618e-
		TIME	0.	0.	10.80060	10.80060	0.	4.213000
41	GLOBAL	MAXIMUM	0.	0.	0.2346877e-21	0.1025585e-22	0.	-0.2118420e-
		TIME	0.	0.	11.56660	11.56660	0.	5.132200
43	GLOBAL	MAXIMUM	0.	0.	-0.7388600e-06	-0.3228818e-07	0.	-0.7813919e-
		TIME	0.	0.	10.80060	10.80060	0.	9.728200

MAXIMUM JOINT ACCELERATIONS AT THE FREE JOINTS

JOINT			/----------TRANS----------			//----------ROTATION----------		
			X-TRANS	Y-TRANS	Z-TRANS	X-ROTATION	Y-ROTATION	Z-ROTATION
2	GLOBAL	MAXIMUM	0.1969477e-01	-0.1880434e-18	-0.3053491e-06	-0.1242659e-19	0.9198031e-02	0.6567944e-
		TIME	4.289600	4.596000	11.56660	4.289600	4.289600	4.596000
4	GLOBAL	MAXIMUM	0.2355262e-01	0.2397213e-18	-0.3058449e-06	0.1093695e-19	0.6188077e-02	-0.7908347e-
		TIME	4.289600	4.289600	11.56660	5.515200	4.596000	4.289600
6	GLOBAL	MAXIMUM	-0.5055775e-01	0.4010073e-15	-0.3066717e-06	-0.2228784e-15	0.2062227e-01	0.1695171e-
		TIME	9.345200	11.56660	11.56660	11.56660	9.728200	9.345200
7	GLOBAL	MAXIMUM	-0.8360804e-01	0.8023473e-15	-0.3071680e-06	-0.1207329e-06	0.4652330e-24	0.3037054e-
		TIME	9.345200	11.56660	11.56660	11.56660	11.56660	9.345200
8	GLOBAL	MAXIMUM	0.9148929e-01	0.4007998e-15	-0.3078305e-06	0.2228968e-15	-0.5623496e-02	-0.3165893e-
		TIME	9.728200	11.56660	11.56660	11.56660	10.18780	9.728200
9	GLOBAL	MAXIMUM	0.9274896e-01	0.1776256e-18	-0.3084930e-06	-0.1212538e-06	0.4693046e-24	-0.3371275e-
		TIME	9.804800	9.804800	11.56660	11.56660	11.56660	9.804800
10	GLOBAL	MAXIMUM	0.7080888e-01	0.7530277e-18	-0.3093226e-06	-0.1811243e-19	-0.1451953e-01	-0.2432033e-
		TIME	9.804800	9.804800	11.56660	10.11120	9.804800	9.804800
12	GLOBAL	MAXIMUM	0.7157493e-01	-0.8157594e-15	-0.3111495e-06	0.4530142e-15	0.1520856e-01	-0.2478023e-
		TIME	9.804800	11.56660	11.56660	11.56660	9.804800	9.804800
13	GLOBAL	MAXIMUM	0.9522944e-01	-0.1630907e-14	-0.3121469e-06	-0.1226899e-06	0.4799461e-24	-0.3463254e-
		TIME	9.804800	11.56660	11.56660	11.56660	11.56660	9.804800
14	GLOBAL	MAXIMUM	0.9725307e-01	-0.3280329e-14	-0.3133132e-06	0.9161695e-15	-0.5196927e-02	-0.3340821e-
		TIME	9.804800	11.56660	11.56660	11.56660	11.33680	9.804800
15	GLOBAL	MAXIMUM	0.9137909e-01	-0.4929114e-14	-0.3144796e-06	-0.1236068e-06	0.4865363e-24	-0.3322012e-
		TIME	9.728200	11.56660	11.56660	11.56660	11.56660	9.728200
16	GLOBAL	MAXIMUM	-0.6091220e-01	-0.4424939e-14	-0.3158161e-06	-0.2801987e-15	0.2009429e-01	0.2093089e-
		TIME	9.345200	11.56660	11.56660	11.56660	9.421800	9.345200

18	GLOBAL	MAXIMUM	-0.2275397e-01	-0.5306428e-14	-0.3186924e-06	0.7699746e-15	-0.3814066e-02	0.7599400e-0
		TIME	9.345200	11.56660	11.56660	11.56660	11.33680	9.268600
20	GLOBAL	MAXIMUM	0.3947297e-01	-0.8419200e-14	-0.3219450e-06	0.9593201e-15	-0.1207995e-01	-0.1352068e-0
		TIME	9.651600	11.56660	11.56660	11.56660	5.438600	9.651600
21	GLOBAL	MAXIMUM	0.5643806e-01	-0.1014586e-13	-0.3236580e-06	-0.1272144e-06	0.5116006e-24	-0.2044620e-0
		TIME	9.651600	11.56660	11.56660	11.56660	11.56660	9.651600
22	GLOBAL	MAXIMUM	-0.3772682e-01	-0.8494391e-14	-0.3255461e-06	-0.9175135e-15	0.1572141e-01	-0.1212963e-0
		TIME	4.749200	11.56660	11.56660	11.56660	5.438600	5.132200
23	GLOBAL	MAXIMUM	0.1535114e-01	-0.6842806e-14	-0.3274343e-06	-0.1286987e-06	0.2700554e-22	-0.6033828e-0
		TIME	4.596000	11.56660	11.56660	11.56660	11.56660	5.132200
45	GLOBAL	MAXIMUM	0.2105851e-01	0.7615646e-18	0.6843377e-06	0.1248624e-19	0.9058816e-02	0.6463004e-0
		TIME	4.289600	4.596000	10.80060	4.289600	4.289600	4.596000
46	GLOBAL	MAXIMUM	0.3213322e-01	-0.5329129e-19	0.6859368e-06	0.2696087e-06	0.4365712e-22	-0.1171928e-0
		TIME	4.289600	4.289600	10.80060	10.80060	11.56660	4.289600
47	GLOBAL	MAXIMUM	0.2487682e-01	-0.9489250e-18	0.6882485e-06	-0.1093691e-19	0.6328217e-02	-0.7995410e-0
		TIME	4.289600	4.289600	10.80060	5.515200	4.596000	4.289600
48	GLOBAL	MAXIMUM	0.1168287e-01	0.4189212e-19	0.6905602e-06	0.2714260e-06	0.4388839e-22	0.4271999e-0
		TIME	4.289600	9.345200	10.80060	10.80060	11.56660	3.906600
49	GLOBAL	MAXIMUM	-0.5004158e-01	-0.9089155e-15	0.6935895e-06	0.5054715e-15	-0.2060256e-01	0.1753076e-0
		TIME	9.345200	10.80060	10.80060	10.80060	9.345200	9.345200
50	GLOBAL	MAXIMUM	-0.8505895e-01	-0.1819684e-14	0.6966187e-06	0.2738073e-06	0.4419713e-22	0.3104862e-0
		TIME	9.345200	10.80060	10.80060	10.80060	11.56660	9.345200
51	GLOBAL	MAXIMUM	0.9194175e-01	-0.9079136e-15	0.7003717e-06	-0.5054938e-15	-0.5629865e-02	-0.3205437e-0
		TIME	9.728200	10.80060	10.80060	10.80060	10.18780	9.728200
52	GLOBAL	MAXIMUM	0.9361960e-01	-0.1776256e-18	0.7041248e-06	0.2767575e-06	0.4458394e-22	-0.3416092e-0
		TIME	9.804800	9.804800	10.80060	10.80060	11.56660	9.804800
53	GLOBAL	MAXIMUM	0.7043180e-01	-0.2939882e-17	0.7086094e-06	0.1811243e-19	0.1453044e-01	-0.2465481e-0
		TIME	9.804800	9.804800	10.80060	10.11120	10.11120	9.804800
54	GLOBAL	MAXIMUM	-0.4177685e-01	-0.1146483e-18	0.7130940e-06	0.2802829e-06	0.4504956e-22	0.1528618e-0
		TIME	9.345200	9.804800	10.80060	10.80060	11.56660	9.345200
55	GLOBAL	MAXIMUM	0.7118815e-01	0.1891471e-14	0.7183195e-06	-0.1050066e-14	0.1514885e-01	-0.2508165e-0
		TIME	9.804800	10.80060	10.80060	10.80060	9.804800	9.804800
56	GLOBAL	MAXIMUM	0.9596308e-01	0.3780289e-14	0.7235451e-06	0.2843907e-06	0.4559488e-22	-0.3501462e-0
		TIME	9.804800	10.80060	10.80060	10.80060	11.56660	9.804800
57	GLOBAL	MAXIMUM	0.9684953e-01	0.7655964e-14	0.7295224e-06	-0.2152163e-14	-0.5091827e-02	-0.3374709e-0
		TIME	9.804800	10.80060	10.80060	10.80060	11.33680	9.804800
58	GLOBAL	MAXIMUM	-0.9176523e-01	0.1152807e-13	0.7354997e-06	0.2890895e-06	0.4622095e-22	0.3348502e-0
		TIME	9.345200	10.80060	10.80060	10.80060	11.56660	9.345200
59	GLOBAL	MAXIMUM	-0.6034394e-01	0.9678255e-14	0.7422412e-06	0.1028286e-14	0.2006385e-01	0.2126604e-0
		TIME	9.345200	10.80060	10.80060	10.80060	9.421800	9.345200
60	GLOBAL	MAXIMUM	-0.2474407e-01	0.7826241e-14	0.7489827e-06	0.2943890e-06	0.4692897e-22	0.9047031e-0
		TIME	9.345200	10.80060	10.80060	10.80060	11.56660	9.345200
61	GLOBAL	MAXIMUM	-0.2217303e-01	0.1189690e-13	0.7565024e-06	-0.2261253e-14	0.3784458e-02	0.7619197e-0
		TIME	9.345200	10.80060	10.80060	10.80060	13.25180	9.345200
62	GLOBAL	MAXIMUM	-0.1947783e-01	0.1596675e-13	0.7640221e-06	0.3003003e-06	0.4772311e-22	0.7101045e-0
		TIME	9.268600	10.80060	10.80060	10.80060	11.56660	9.268600
63	GLOBAL	MAXIMUM	0.3935781e-01	0.2022007e-13	0.7723356e-06	-0.2362393e-14	-0.1208169e-01	-0.1346602e-0
		TIME	9.651600	10.80060	10.80060	10.80060	5.438600	9.651600
64	GLOBAL	MAXIMUM	0.5626177e-01	0.2447135e-13	0.7806491e-06	0.3068356e-06	0.4860205e-22	-0.2050846e-0
		TIME	9.651600	10.80060	10.80060	10.80060	11.56660	9.651600
65	GLOBAL	MAXIMUM	0.3834661e-01	0.2058410e-13	0.7897738e-06	0.2159937e-14	0.1747129e-01	-0.1125274e-0
		TIME	5.132200	10.80060	10.80060	10.80060	10.03460	5.132200
66	GLOBAL	MAXIMUM	0.1761208e-01	0.1669558e-13	0.7988984e-06	0.3140085e-06	-0.1164636e-22	-0.6916214e-0
		TIME	8.426000	10.80060	10.80060	10.80060	10.80060	8.426000
36	GLOBAL	MAXIMUM	0.1928537e-01	0.3486015e-20	0.2690637e-03	0.1060868e-03	-0.1591420e-18	-0.7611726e-0
		TIME	5.132200	10.41760	11.56660	11.56660	11.56660	5.132200
38	GLOBAL	MAXIMUM	0.7077232e-02	0.1535006e-21	-0.2865489e-23	-0.8683894e-24	0.3466987e-23	-0.2750006e-0
		TIME	4.213000	3.906600	10.80060	10.80060	11.56660	4.213000
39	GLOBAL	MAXIMUM	0.2222297e-01	-0.1024501e-19	0.2145865e-18	0.8460742e-19	0.1589393e-18	-0.8771164e-0

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                      TIME       5.132200        5.132200        11.56660        11.56660        11.56660        5.132200

 42        GLOBAL     MAXIMUM    0.2318638e-01  -0.1663231e-20  -0.1031979e-04  -0.3765801e-05  -0.6727524e-21  -0.9113449e-0
                      TIME       9.728200        8.426000        10.80060        10.80060        10.80060        9.728200
 (  174) > $ combine   'loading 1' 'loading 2' 'loading 3' max dis max acc
 (  174) > $    list dynamic eigenvalues 50 eigenvectors 1 max dis max acc
 (  174) > $ times from 0.0 to  300.0 at 0.32635 joints all members all
 (  174) >  $ times from 0.0 to 15.905678 at 0.07952839   joints all members all
 (  174) >   finish
0---------------- G L O B A L   S T A T I S T I C S ---------------
0CPU time: 0:28:2.4         Elapsed time: 0:56:26.0
 Memory: 132944 bytes,  Disk excps N/A
0--------------- P R O G R A M   S T A T I S T I C S ---------------
0PML cache hits are 797 out of 975 (81%)
 Size of PML cache is 3, maximum IPQ size is 4
   0 modules from disk, 0 from cache, 888 static
   0 bytes in longest command chain
 Modules in longest chain:  finish
0---------------- M E M O R Y   S T A T I S T I C S ---------------
0  0 compactions, 0 level-1, 0 level-2, 0 level-3 reorgnizations
  10 pools of 524288 bytes total 5242880 bytes (3943%)
  32 growth step, 1/32 hole table factor
0----------------- D I S K   S T A T I S T I C S -----------------
0User cache (U_C) blocks 5, System cache (S_C) blocks 10, Block size 8192
 F_Info 71, F_Open 1, F_Close 3, R_Get 70, R_Put 1, R_Del 1
 B_Read 5, B_Write 5, S_C_Read 0, S_C_Write 5, U_C_Read 210, U_C_Write 3
```