EUR 3633 e

THE CODES COSTANZA FOR THE DYNAMICS OF LIQUID-COOLED NUCLEAR REACTORS

by

G. FORTI and E. VINCENTI

1967

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CORRIGENDUM

The Codes Costanza for the Dynamics of Liquid-Cooled Nuclear Reactors
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Pag. 35 ISN 0129

Errata   : FLIM2(M) = POWER(M)/(SF1(M)*FLM1(M)+SF(M)*FLM2(M))

Corrige : IF(POWER(M).GT.0.0)FLIM2(M) = ...etc...

Pag. 37 ISN 0192

Errata   : POWER(MR) = (SF1(MR)*FLM1(MR)+SF(MR)*FLM2(MR))/FLIM2(MR)

Corrige : POWER(MR) = (SF1(MR)*FLM1(MR)+SF(MR)*FLM2(MR))*FLIM2(MR)

Pag. 49 last line ISN 046

Errata   : RR = 1./VLR(L1)

Corrige : IF(VLR(L1).GT.0.0)RR = 1./VLR(L1)

Pag. 90 ISN 0042

Errata   : RR = 1./VLR

Corrige : IF(VLR.GT.0.0)RR = 1./VLR

The numerical values at page 70 are not correct. As they are given only as an example, we do not give here the correct values.

The Decks deposed at Ispra are already corrected.

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The two codes COSTANZA cylindrical and COSTANZA axial, written in FORTRAN-H for IBM 360/65, solve the kinetics diffusion equations in two groups and one dimension (plane geometry for COSTANZA axial, radial geometry for COSTANZA cylindrical). The neutronic calculation is coupled with the calculation of the heat transmission from the fuel to the cladding and to the coolant, and with the thermohydraulics of channels with forced circulation of liquid coolant.

The geometry of fuel element and channel may be cylindrical or slab. Up to ten groups of delayed neutrons are allowed.

Temperature feedback of fuel (Doppler) and coolant are considered independently and affect the nuclear constants. Control rod movement or diffused poison concentrations are simulated by externally imposed variations of the thermal absorption cross section in the different regions of the reactors.

Inlet temperatures and mass flow in the coolant channels may be varied according to any externally given time table.

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SUMMARY

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KEYWORDS

- 3 -

CONTENTS

THE CODES COSTANZA FOR THE DYNAMICS OF LIQUID-COOLED NUCLEAR REACTORS[+]

1) Purpose.

The codes COSTANZA, axial and cylindrical, treat the dynamics of nuclear reactors. The nuclear time dependent diffusion equations in two energy groups and one spatial dimension are solved numerically in a finite difference scheme, toghether with the heat transmission equations in the channels. The channel consists of a fuel region, in which the thermal power is proportional to the fission density, of a gap and a clad surrounded by a region of liquid coolant with forced circulation. The coolant flow rate is externally imposed as an input function of time, and there is no calculation of pressure drop. The nuclear constants are affected linearly by the temperatures of the fuel and of the coolant.

The codes are best suited to analyse transient of short duration (uo to some seconds) implying rather strong local reactivity surges, such that cannot be treated by conventional point kinetics, but not so severe to produce vaporization of the coolant and strong damage to the fuel elements. For stability studies, the codes are rather expensive in computer time, and should be employed only when detailed spatial aspects of the phenomena are essential, thereby excluding a point model kinetics treatment.

In conclusion these codes have been developed to treat intermediate accidents in safety studies, in which the reactor conditions may still be considered "normal" even though the flux shape is considerably altered with respect to the steady state. The codes in the version presented here are a development of the code COSTANZA cylindrical (EUR 3171 e) to which the reader is referred for all physical information and for the essential points of numerical methods.

[+]Manuscript received on August 7, 1967.

The axial code follows the same pattern, and in this report only the differences from the original code will be considered in detail.

2) COSTANZA cylindrical.

For the two groups flux calculation a direct method is employed following what is exposed in EUR 596 e by R. Monterosso and E. Vincenti. The flux calculation routine has been coded in double precision, as this has been found necessary because of the rounding off error inherent to the 360-65 computer (one digit of precision less than 7090). Considering the results given in the report just mentioned, and from further experimentation with the present code, it may be stated that a neutronic time step of 1/15 of the minimum period during the transient gives accurate results.

A maximum of 100 mesh points is allowed. Mesh spacing is arbitrary. Up to ten groups of delayed neutrons are considered.

The reactor may be divided in up to 10 regions of different composition. Each region may contain a typical cooling channel which is divided in up to 20 axial segments of uniform length. The axial flux shape is arbitrarily given by points in each channel, and is kept constant in time. The total power of each channel is also given arbitrarily in initial conditions and will follow, during the transient, the evolution of the average fission density in the corresponding region. Radially, at each level in each channel, up to 10 mesh points are considered for fuel temperature, plus one for the gap, one for the cladding and one for the coolant. The average fuel temperature in each zone affects linearly the resonance escape probability, while the coolant temperature affects the thermal absorption cross

section.

In each region independently the thermal poison cross section may be arbitrarily given as a function of time to simulate control. Furthermore a free routine TEST, is available for changing the control specifications or any other datum of the problem when any specified conditions are met during the transient. The user must write his own program to meet his own specifications if he wants to utilize this option. The sole rule is to respect the commons, which are included in the dummy TEST routine included in the deck. As long as the control data only are interfered with, no special caution is required, and it is not necessary to bother with the rest of the programme. If on the contrary the user wants to change other parameters, he must be willing to study in detail the structure of the programme to avoid computations catastrophes. Inlet temperature and coolant velocities in each channel are independent arbitrary functions of time, given by time tables in input.

It should be remembered that steps in inlet temperatures or velocities lead, because of the central difference method of calculations, to numerical oscillations in some cases (see EUR 3171 e).

In most cases the occasional occurring of these oscillations will not seriously impair the general behaviour of solutions in physical cases.

3) COSTANZA axial.

For the axial code, the same specifications and methods as for radial code apply, unless explicitly stated.

The mesh spacing is constant and the neutronic lattice coincides with the temperature lattice in the single coolant channel. Temperature feedback is applied point by point and not region-wise. All neutronic constants may be affected linearly by the fuel temperature (averaged throughout the radius of the rod) and by coolant temperature independently. To avoid unphysical oscillations in temperature of coolant, a backwards difference method is adopted in coolant calculations instead of central differences. This leads to a greater error but the possibility of closer mesh spacing (up to 100 points in channel) makes it tolerable.

This method has been preferred to avoid confusions in temperature stability calculations, caused by the introduction of spurious oscillations.

Control specification allows the choice between two options: thermal poisoning of variable amount in each region as in the cylindrical code, or movable boundary of a fixed thermal poison to simulate more accurately rod insertion.

4) Structure of programmes and sequence of the calcu-
   lations.

What follows refers generally to both program-mes. The calculations proceeds in the following steps:

a) Read-out of DATA and preliminary calculations (geo-metry, etc..) - MAIN program.

b) Initialization - neutronics.

A fixed number of time steps in neutronic calcu-lations (given in input) allows to obtain approxi-mately the static distribution of fluxes in the i-nitial (stationary) conditions normalized to any wanted value of thermal flux, starting from a flat

flux guess. The normalization value may be conveniently chosen as 1 as power normalization is given independently of flux normalization. If a source is present, the problem is heterogeneous and only one step for the calculations of fluxes is needed. Of course in this case no normalization is possible.

When the requested number of steps is accomplished, the concentration of the delayed neutron precursors are evaluated at equilibrium with the fluxes.

This step in the programme is controlled by the subroutine INIZ. The coefficients are evaluated from the neutronic constants in the subroutine MAT and actual calculation of fluxes by the subroutine FLUSSI. These same subroutines are employed for the whole programme.

c) Criticality search (optional).

A criticality search is performed by varying the thermal poison concentration in any wanted region until the reciprocal of period of the average thermal flux differs from zero by less than a fixed amount. The first guess of poison is zero and the second guess is given in input. The successive values are obtained by linear interpolation on poisons.

To speed up the convergence, the time step for this calculation is fixed at each iteration as $1/100$ of the last reciprocal period, with a maximum of 1 second.

The convergence is quite fast, and in most cases does not require more than 50 iterations for a full dimensioned problem to reach a reciprocal of period smaller than 10^{-4}.

As the analysis of a transient will normally re-
quire a number of time steps of the order of 1000,
the machine time required for criticality is negli-
gible.

When the convergence is reached, the fluxes are
normalized to the desired value of average thermal
flux and the concentrations of the delayed neutron
precursors are adjusted to equilibrium with the flux-
es. In the axial programme the criticality search may
be done optionally by varying the depth of insertion
of a fixed thermal poison.

This part of the programme is controlled by the
subroutine CRITIC.

Of course no criticality search is allowed in
source problems.

d) Thermal initialization.

The steady state temperature distribution in fuel,
cladding and coolant are then calculated for each
channel (for the single channel in the axial code)
from the total power of the channels as given in in-
put. The ratio between thermal power and fission den-
sity is memorized to be used during the transient.

The coefficients for the thermal system are set in
the subroutine DCAN. The actual calculations of tempe-
ratures occurs in the subroutine CANCIL or CANSL ac-
cording to geometry specifications (cylindrical or
slab channel). The same subroutines are used in dyna-
mic calculations: in the initialization, the time de-
rivatives are set to zero. Inlet temperatures and ve-
locities of coolant are set in the subroutine VINIZ.

In the axial code the power distribution follows
the fission density distribution previously calculat-
ed.

In the cylindrical code the axial power distribution is given in input for each channel and set in subroutine POT while the average temperatures in fuel, cladding and coolant are evaluated for each channel in subroutine INTEGR and memorized to give the reference initial temperature for calculating the feedback in the corresponding regions during transient.

The subroutines GAPIZ and HTC are optionally used to introduce variable GAP thermal resistance and surface to coolant heat transfer coefficients. During the transient the subroutine GAP is used for the same purpose as GAPIZ. Two different routines are provided for this purpose, as some recycling of calculations may be needed in initialization. The two routines given in the deck are only an example and the user may build his own routines (see input key).

e) Dynamic calculations.

At the end of initialization the control is transferred to the MAIN programme. The dynamic calculations begin, with a fixed time step given in input. At each time step the neutronic time dependent equations are solved (subroutine FLUSSI) with the coefficients varied (subroutine MAT) according to the externally imposed control variations of thermal poison cross section and the currently determined temperature feedbacks.

The control specifications are introduced in the subroutine BARRE (in the axial code the subroutine is only used for movable boundary control, fixed boundary control is directly introduced in MAIN).

The temperature feedback is determined by the channel dynamic calculations. These are made by the routines CANCIL and/or CANSL at every fixed number of neutronic time steps. Very often the thermal calculation time step may be fixed at 10 times the neutronic time step or more.

At every time step the concentrations of the delayed neutron precursors are varied according to the last value of fission density.

Optionally at each time step a free routine TEST is called and may be used to vary a parameter according to any wanted condition.

The same subroutine TEST is called before beginning the dynamic calculation. In the dummy routine included in the listing this first call sets the indicator KTE = 0, thus preventing any further calling.

After a given number of time steps the calculation stops and a final printing is done. A new problem may then be started in the same run. The subroutine AZER is employed at the beginning of each problem to reset to zero the variables which require it.

The output editing during dynamic calculation is controlled by the subroutine STAMPA which is called by the MAIN programme according to a very flexible pattern.

5) Computer specifications and programmes performance.

The version given in appendix of the programmes is written in FORTRAN - 360 and has been assembled under the IBM 360 - OS in FORTRAN - H level 0. The total length of the programmes resulted to be 117, 588 storage locations, all included, for COSTANZA cylindrical and 112,080 for COSTANZA axial.

The computer time required depends on the wanted number of points, on the number of channels and the frequency of thermal calculations, etc...

No thorough experimentation has been made separately on these items. In common application the main part of the time consumed should however be attributed to flux

calculation and is therefore proportional to the number of meshes times the number of steps.

For average problems of 50 points, one to two minutes will be required for every 1000 time steps.

As for the exactitude of calculations, the static flux distribution and criticality search have been checked against analytical solutions for simple problems, and well knows codes (WANDA 4) for more complicate cases, obtaining a nearly perfect agreement.

The dynamic calculation has also been tested for very simple (homogeneous, no feedback, no delayed neutrons) cases against analytical solutions. When the time step is conveniently chosen (1/15 of period as already mentioned) errors on periods are very small (0.1% or less).

It is worth to note that when the time step is too large, the codes tend to give too fast excursions of fluxes with positive reactivity. This property has been consistently found by us in all cases tried and is tied to the direct method for flux calculations.

The iterative method tends to behave in the opposite way. The direct method, which is faster for the same precision (see EUR 596 e. already mentioned) has thus the further practical advantage of being biased on the safe side for the commonest incident analysis.

The two codes are available at CETIS - EURATOM - - C.C.R. ISPRA and have received the job numbers 60.5937 for COSTANZA cylindrical and 60.5936 for COSTANZA axial.

6) Output.

The output of each problem begins with the vector

of all the data of the problem. The rest of the output, which varies according to the choice of the user (see input keys) is largely self-explanatory: we give here the symbols used and the translations of Italian headings in the order in which they appear in a typical output.

TO   ≡ time
IT   ≡ iteration
PER   = period
PINT   ≡ time integral of average thermal flux
R   = radii (cylindrical code only)
P1   = fast flux
P2   = thermal flux
PM1   = average fast flux - whole reactor
PM2   = average thermal flux - whole reactor
FLM1   = average fast fluxes over regions
FLM2   = average thermal fluxes over regions
RICERCA CRITICITA =
          = criticality search
REGIONI AVVELENATE =
          = poisoned regions
BARRE A BANCO - SEZIONE DI VELENO ≡
          ≡ banked rods - poison cross-section
SPRG   ≡ second guess of poison (or rod insertion)
DAPF   ≡ convergence criterium for search
LF   ≡ maximum number of steps for search
REP   ≡ reciprocal of period
VELENO   ≡ poison
CANALE   ≡ channel

Under this heading a map of temperatures is given each line give the temperatures at one level from center of fuel to coolant

TIPO = type (1 = cylindrical; 2 = slab)

TEMPERATURE MEDIE =

      = average temperatures (for cylindrical code)

M   = region index

TU   = fuel average temperature

TG1 = cladding 1 (gap) average temperature

TG2 = cladding average temperature

TR   = coolant average temperature

VELENI BARRE =

      = control poison for transient (cylindrical code)

VBAR = control poison or control rod insertion for
transient (axial code)

7) Input form.

A title card is the first input card of each problem (see keys).

A vector of 3500 memory positions DATA (1) ...DATA (3500) contains all the data. Since entire groups of memory positions are zero, it is possible to read different sets of significant data; each set must be preceded by a card containing the integers K_{i1}, K_{i2} defining the first and last datum of the set. K_{i1} and K_{i2} are given in integer form adjusted to the right at columns 12 and 24. **The last set of a problem is indicated by -1 in columns 1 and 2.** The data of each set are all in floating form (FORMAT E12.8). Any number of problems may be run in sequence and only the data changed in the preceding problem need to be given. A title card must be presented for each problem.

TITLE 1

col.12| col.24|

   K_{11} K_{12}
DATA(K_{11}) DATA(K_{11}+1) DATA(K_{11}+2)....DATA(K_{12}) 1st set

   K_{21} K_{22}
DATA(K_{21}) DATA..........etc.................... 2nd set

   ....

-1 K_{n1} K_{n2}
DATA(K_{n1}) ....last set

TITLE 2

.......................etc.......................

A.1   APPENDIX A

                         COSTANZA cylindrical - input key

Title Card - A positive integer in columns 1-6 means that the problem
is the last of the run. Any alphanumerical information may appear in col.s
7-72 and will be printed in the output.

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
1	DELT	Δt(sec) neutronic time step for transient		1/15 of minimum expected inverse period generally gives good results.
2	DELT	Δt(sec) neutronic time step for initialization (10^{20} if source problem)		
3	SI	Average thermal flux initial normalization value		If the problem is not homogeneous (source are present) put 0.
4	IMAX	Number of mesh points	$\leqslant 100$	Point 1 is symmetrical of point 2 with reactor axis. Last
5	NREG	Number of regions (for different composition and/or typical coolant channel characteristics)	$\leqslant 10$	point corresponds to the outer (extrapolated) boundary of the reactor.
6	NRIT	Number of delayed neutrons groups	$\leqslant 10$	
7	Bu	B^2 - Transverse buckling (cm^{-2}) (same for all region and groups)		
8	IDST	Number of steps for initialization (50)		
9	ITCR	If $\geqslant 1$ criticality poison search is done		If the problem is not homogeneous put 0.
10	NCAN	Number of typical coolant channels	$\leqslant 10$	
11	KPC	Thermal calculation is done every KPC neutronic step		

A.2

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
12	KTME1	Average temperatures in channels are printed every KTME1 thermal step		
13	KMA1	Temperature maps in channels are printed every KMA1 KTME1 thermal step		
21-30	PØWER	Total power in typical channels for every region in initial condition (any unit may be used provided they are consistent throughout the input - no factor is built in)		These data shall be given for every region in sequence.If no channel is present in some region the corresponding value myst anyways be given or left blank.
31-40	BETA	βi delayed neutrons yelds per fission		
41-50	DLI	λi delayed neutrons precursors decay constants		
61-71	I1-I2	Region boundary mesh numbers		1 and IMAX must be given as 1st and last values.

NUCLEAR CONSTANTS
Region 1

81	D1	Diffusion coefficient-fast group		
82	SR	$\Sigma_r = \Sigma_{a_1} + \Sigma_{s_\rho}$ removal cross section		
83	P	p resonance escape probability		
84	SF1	$\nu\Sigma_{f_1}$		
85	W	ν_1 (cm/sec) neutron velocity for fast group		
86	SOR	Neutron flux source density (fast)		
87	D2	Diffusion coefficient-thermal group		
88	SA	Σ_{a_2} thermal absorption cross section		

A.3

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
89	SP	Σ_p residual poison cross section		This is a datum which is added to Σ_{a_2} and kept constant during transient and search
90	SF	$v\Sigma_{f_2}$		
91	V	V (cm/sec) neutron velocity (thermal group)		
92	ICAN	≥ 1 if channel is present in the region		
93-104	etc..	same for 2nd region		
2I1-300	X	Distance of mesh points from axis		They are arbitrary, except X(1) = -X(2)

CONTROL ROD MOVEMENT

301-330	–	Times of successive poison values		The first time value must always be 0. Any number of successive times (up to 30) and corresponding Σ_p values may be given for each region, the code will linearly interpolate between the values to get the current Σ_p for each time step. After the last time given, Σ_p will be fixed to its last value.
331-360		Corresponding values of $\Sigma_p(t)$ for first region		
361-390		Times for 2nd region		
391-420		Σ_p for 2nd region		
etc..				

TEMPERATURE COEFFICIENTS

1301-1310	CØU	Temperature coefficients of fuel for every channel. They affect the resonance escape probability according to $P = P_0 + P_0 * COU * (\bar{T}_{fuel} - \bar{T}_{0fuel})$		Give one value for each ty pical channel present in succession.

A.4

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
1311-1320	CØR	Temperature coefficients of coolant for every channel. They effect Σ_{ath} $$\Sigma_{ath} = \Sigma a_o - \Sigma a_o \, xCORx(T_c - T_{co})$$		Note the minus sign. A positive coefficient will bring positive δK_{eff}.
1601-1610	KV(I)	I if poison is present in region I 0 if not		
1611	SPRG	Second guess of Σ_a poison cross section (same for all region checked)		No fast group poison is allowed 1st guess is zero.
1612	DAPF	(10^{-4}) convergence criterium for search. Reciprocal of period will be $\leqslant$ DAPF		
1613	LF	Maximum number of trials for search (100)		

PRINTING INSTRUCTIONS

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
1851+6n	KTP	Number of time steps for n^{th} printing pattern		n=0, 1, 2 etc..
1852+6n	I1P	Number of time steps after which the more frequent type of printing is done		As many cards as wanted can be given, allowing different successive printing patterns. After the last is completed the calculation stops ans a final print is done. Then the control is transferred to the beginning of the pro- gramme to start a new problem, unless the ti- tle card is checked, in which case the run is stopped.
1853+6n	I1S	Type of more frequent output 1 only average fluxes and period 2 complete map of fluxes and delayed neutron pre- cursors concentration 3 average fluxes in the reactor and region by region	1,2,3	
1854+6n	I2P	Number of time steps for less frequent type of output. Must be multiple of I1P and divisor of KTP		
1855+6n	I2S	Same as I1S for less frequent output	1,2,3	
1856+6n		Not employed		

A.5

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
		Axial Power Distribution		
2001-2020		Axial power distribution for 1st channel. Relative values are significant. Normalization is performed by the code.		The axial power distribution may be dif - ferent for each chan- nel and is kept cons- tant during transient.
20021-2040		Same for 2nd channel		As many point as there are axial zones in
etc..				thermal calculation must be given for each channel (see further).
		COOLANT CHANNELS DATA		
2500	CØST	Generally not employed. It is transmitted as an argument to GAP and GAPIZ free routines and may be used to transmit conversion factors, as in the example given in the list		
		First channel		
2501	N	Number of mesh points in fuel	$\leqslant 7$	
2501	NSV	Number of axial zones	< 20	
2503	–	Diameter of fuel rod or thick- ness of slab		
2504	DR(NP1)	Thickness of gap		If no gap is present, do not put0, but cut
2505	DR(NP2)	Thickness of cladding		in half the cladding DATA(2504)+DATA(2505)=
2506	DR(NP3)	Thickness of coolant		=Thickness of cladding
2507	RO(I)	Density of the fuel		
2508	RO(NP1)	Density of gas in the gap		If no gap is present put the value for
2509	RO(NP2)	Cladding density		cladding (see follow- ing).
2509	RO(NP3)	Coolant density		
2511	SC(I)	Fuel specific heat		
2512	SC(NP1)	Gap specific heat		If no gap DATA(2512)= DATA(2513)
2513	SC(NP2)	Cladding specific heat		
2514	SC(NP3)	Coolant specific heat		

A.6

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
2515	–	Thermal conductivity of fuel		
2516		Thermal conductivity of gap (If zero the gap resistence is variable and will be evaluated by the free routines GAP and GAPIZ -for initial stationary calculation-)		If no gap DATA(2516)=DATA(2517).
2517		Thermal conductivity of cladding		
2518		Heat transfer coefficient to coolant (put zero if variable -will be calculated by the routine HTC)		
2519		Lenght of channel		
2520		Slab width		Only in case of slab geometry. Ignored for cylinder.
2521		Inlet temperature of coolant at equilibrium initial conditions (put zero if inlet temperature is tabulated as function of time)		
2522		Step of coolant inlet temperature		Only if DATA(2521)$\neq$0.
2523		Value of $\frac{dT}{dt}$ for ramp in coolant inlet temperature		idem
2524	W	Initial value of coolant velocity (put zero if tabulated)		
2525		Step of coolant velocity		Only if DATA(2524)$\neq$0.
2526		Value of $\frac{dW}{dt}$ for ramp in coolant velocity		Only if DATA(2524)$\neq$0.
2530	ITIPO	Type of channel $\begin{cases} 1 & \text{cylindrical} \\ 2 & \text{slab} \end{cases}$	1,2	
2531-2560		Same data for 2nd channel		

etc..

A.7

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
		VARIABLE INLET TEMPERATURE		
2801–2810		Inlet temperature values for 1st channel		Only if DATA(2521) and analogous are 0.
2901–2910		Corresponding times for 1st channel		First time must be 0.
2811–2820		Same for 2nd channel		
2911–2920				
		VARIABLE COOLANT VELOCITY		
3001–3010		Velocity values for 1st channel		
3101–3110		Corresponding times		First must be 0.
		VARIABLE HEAT TRANSFER COEFFICIENT		
3201	a_1			The formulae are:
3202	a_2			$h = \frac{\lambda}{D} \cdot a_{12} R^{a_{19}} Pr^{a_{20}}$
3203	a_3			$Pr = \frac{\eta C_p}{\lambda} \qquad R = \frac{\rho \upsilon D}{\eta}$
3204	a_4	coefficients in formulae for h=heat transfer coefficient in 1st channel		
3205	a_5			$\rho = a_1 + a_2 \frac{1}{T} + a_3 \frac{1}{T^2} + a_4 \frac{1}{T^3}$
3206	a_6			$C_p = a_5 + a_6 T$
3207	a_7			$\eta = a_7 + a_8 \frac{1}{T} + a_9 \frac{1}{T^2} + \frac{a_{10}}{T^3}$
3208	a_8			
3209	a_9			$\lambda = a_{11} + a_{12} T$
3210	a_{10}			
3211	a_{11}			
3212	a_{12}			
3213–16	not employed			

A.8

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
3217		D=hydralic diameter of coolant channel		
3218	a_{18}			
3219	a_{19}			
3220	a_{20}			
3221		Same for 2nd channel		
3240				
etc..				

B.1   APPENDIX B

                    COSTANZA axial - input key

Title Card - A positive integer in columns 1-6 means that
the problem is the last of the run. Any alphanumerical informa-
tion may appear in columns 7-72 and will be printed in the
output.

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
1	DELT	Δt(sec) neutronic time step for transient		1/15 of minimum expected inverse period generally gives good results.
2	DZ	ΔZ(cm) axial mesh size		
3	IMAX	Number of mesh points	$\leqslant$ 100	The boundaries of the reactor correspond to point 1 and IMAX.
4	NREG	Number of regions of different composition	$\leqslant$ 10	
5	NRIT	Number of delayed neutrons groups	$\leqslant$ 10	
6	IDST	Number of steps for initialization (50)		Put 1 if source problem.
7	ITCR	If $\geqslant$ 1 criticality poison search is done		
8	IDIR	0 diffused poison	0, 1, 2	For criticality search. By top is meant the first mesh point which corresponds to entry coolant, if a channel is present.
		1 banked bars from top (entry of coolant)		
		2 banked bars from bottom		
9	SI	Average thermal flux initial normalization value		Put 0 if source problem.
10	BU	B^2 - Transverse buckling (same for 2 groups)		

B.2

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
11	DELT	Δt(sec)neutronic time step for initialization and cricality search (10^{-4})		Put 10^{20} if source problem.
12	IDIR	Same as data (8) for transient impressed reactivity		
12	PØWER	Total channel power in initial conditions (omit if no thermal calculation)		Any unit may be used, provided all thermal and energy units are consistent throughout. No factor is built in the code.
14	KPC	Number of neutronic time steps in a thermal time step		Ignored if no thermal calculation is required.
15	KMA1	Print of temperature map every KMA1 thermal step		
16	IOAN	0 no thermal calculation 1 cylindrical coolant channel 2 slab coolant channel		
31-40	BETA	β_i delayed neutrons yelds per fission		
41-50	DLI	λ_i delayed neutrons precursors decay constants		
61-71	I1,I2	Region boundary mesh numbers		1 and IMAX must be given as first and last value

NUCLEAR CONSTANTS
Region 1

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
81	D1	Diffusion coefficient fast groups		
82	SR	$\Sigma_r = \Sigma_{a_1} + \Sigma_{s1}$ - Removal cross section		
83	P	p resonance escape probability		The constants for every region are included in two cards
84	SF1	$\nu\Sigma_{f_1}$		

B.3

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
85	W	V_1(cm/sec) neutron velocity fast group		
86	SOR	Neutron constant source density (fast)		
87	D_2	Diffusion coefficient-thermal group		
88	SA	Σ_{a2} thermal absorption cross section		
89	P1S	Residual poison cross section		This is a datum which is added to a_2 and kept constant during transient and search.
90	SF	$\nu\Sigma_{f2}$		
91	V	Thermal group velocity(cm/sec)		
92		Not employed		

Following regions

93-104 etc..		Same for region 2		

TEMPERATURE COEFFICIENTS

301		$\alpha_f, \alpha_c, \alpha_m (\Sigma_{a2}) \alpha_f \alpha_c \alpha_m$ (P) $\nu\Sigma_{f_1} \quad \nu\Sigma_{f_2}$ $D_1 \quad D_2$ $V_1 \quad V_2$ Σ_r not employed		In each card the temperature coefficients are given for two constants for fuel, coolant and moderator(the moderator coefficients are dummy, as no equation for moderator temperature is included in the code up to now)
331 360 (2nd region)		same for 2nd region		
etc.....				

B.4

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
1601 to 1610	Kv(I)	I if poison is present in region I 0 if not		Only when diffused search is done IDIR = 0
1611	SPRG	Second guess of Σ_a poison cross section or rod insertion (cm)		First guess is zero no fast group is allowed.
1612	DAFF	Convergence criterium for criticality search (10^{-4}) maximum value of reciprocal of period at convergence		
1613	LF	Maximum number of trials for search (100)		
1614	SPB	Control rods equivalent Σ_{a_2} for criticality search		Only if banked rod: DATA(8)=1,2.

PØISON INSERTION

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
1620		Control rods equivalent Σ_a, for transient		Only if banked rods DATA(12)=1,2.
1621-1699	TBAR	Successive times for poison insertion values		As many values as are wanted may be given. After the last time given the value of poison will be kept constant the last point value.
1700	VBAR	Time zero depth of insertion (cm) (IDIR=1,2) or Σ_{a_p} (cm^{-1})		
1701-1779	VBAR	Corresponding values of rod insertion (cm) if IDIR=1,2 or Σ_{a_p} (cm^{-1}) if IDIR=0		
1780+I		Factors which multiply the value VBAR(t) in each region I		Considered only if IDIR=0.

PRINTING INSTRUCTIONS

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
1851+6n	KTP	Number of time steps for n^{th} printing pattern		n=0, 1, 2 etc...

B.5

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
1852+6n	I1P	Number of time steps after which the more frequent type of printing is done		As many cards as wanted can given, allowing different successive printing patterns. After the last is completed the calculation stops and a final print is done. Then the control is transferred to the beginnings of the programme to start a new problem unless the title card contains a positive integer in column 1-6 in which case the run is stopped.
1853+6n	I1S	Type of more frequent output 1 only average fluxes and period 2 complete map of fluxes and delayed neutron precursors concentrations 3 average fluxes in the reactor and region by region		
1854+6n	I2P	Number of time steps for less frequent type of output must be multiple of I1P and divisor of KTP		
1855+n	I2S	Same as I1S for less frequent output		
1856+n		Not used		

COOLING CHANNEL DATA

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
2500	CØST	Generally not employed. It is transmitted as an argument to GAP and GAPIZ routines when the latter are employed. In the example given, it is used to transmit thermal units conversion factor (1.0 Joule°C 4.18 Calories°C)		
2501		Not used		
2502	N	Number of mesh points in fuel	$\leqslant 7$	

B.6

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
2503		Diameter of fuel rod or thickness of slab		
2504	DR(NP1)	Thickness of gap (or half of cladding thickness)		If no gap is present, do not put 0, but cut in half the cladding.
2505	DR(NP2)	Thickness of cladding (or half of it)		
2506	DR(NP3)	Thickness of coolant		
2507	RO(I)	Fuel density		
2508	RO(NP1)	Gap density (or cladding density)		
2509	RO(NP2)	Cladding density		
2510	RO(NP3)	Coolant density		
2511	Sc(I)	Fuel specific heat		
2512	Sc(NP1)	Gap specific heat (or cladding)		
2513	Sc(NP2)	Cladding specific heat		
2514	Sc(NP3)	Coolant specific heat		
2515		Thermal conductivity of fuel		
2516		Thermal conductivity of gap (or cladding). If zero the gap resistance is variable and calculated by special routines GAP and GAPIZ		The free routines GAP and GAPIZ must be built by the user. In the deck an example of both is included.
2517		Thermal conductivity of cladding.		
2518		Heat transfer coefficient to coolant (put zero if variable-will be calculated by the routine HTC)		
2520		Slab width (only for slab case)		

B.7

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
2521	TPI	Inlet temperature of coolant at equilibrium (put zero if inlet temperature is tabulated		
2522		Step in inlet temperature		
2523		Slope of inlet temperature for ramp		
2524	WS	Velocity of coolant at equilibrium (put 0 if inlet velocity is tabulated)		
2525		Step of velocity		
2526		Slope for ramp of inlet velocity		

B.8

DATA N°	VARIABLE NAME	DESCRIPTION	ALLOWABLE VALUES	NOTES
		TABULATED INLET TEMPERATURE		
2801-2810	TPI	Inlet temperature values		
2901-2920		Corresponding times		
		TABULATED INLET VELOCITY		
3001-3020	WS	Velocity values		
3101-3120		Corresponding times		

VARIABLE HEAT TRANSFER-COEFFICIENT

DATA N°	VARIABLE NAME	DESCRIPTION
3481	A1	a_1
3482		a_2
3483		a_3
3484		a_4
3485		a_5
3486		a_6
3487		a_7 coefficients in formulae 2-7
3488		a_8
3489		a_9
3490		a_{10}
3491		a_{11}
3492		a_{12}
3497	DIAH	Hidraulic diameter of coolant channel Dh
3498		a_{18}
3499		a_{19} coefficient in formula (1)
3500		a_{20}

The formulae are:

1) $h = \dfrac{\lambda}{Dh}\, a_{18} \cdot R^{a_{19}} \cdot Pr^{a_{20}}$

2) $Pr = \dfrac{\eta C_p}{\lambda}$

3) $R = \dfrac{\rho v\, D_h}{\eta}$

4) $\rho = a_1 + \dfrac{a_2}{T} + \dfrac{a_3}{T^2} + \dfrac{a_4}{T^3}$

5) $Cp = a_5 + a_6 T$

6) $\eta = a_7 + \dfrac{a_8}{T} + \dfrac{a_9}{T^2} + \dfrac{a_{10}}{T^3}$

7) $\lambda = a_{11} + a_{12} T$

APPENDIX C

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
          C      COSTCI
          C      MAIN
          C              COSTANZA    -   CILINDRICO                              COS70020
          C                                                                     COS70040
ISN 0002         REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0003         COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0004         COMMON/COMN/KBA,KTE,KBAR,KS,NREG,IDST,ITCR,IT,LF,L1,IMAX,KBI,NRIT,
                1IM1,NK,    SI,REP,SPCR,SBETA,PER,PINT,BU,VOLT,            SPRG,DAP
                2F,DELT,DLD,DLM,
                3D1(10),D2(10),SF(10),SR(10),SA(10),SPR(10),SF1(10),SOR(10),W(10),V
                4(10),SP(10),P(10),BETA(10),DL(10),DLDT(10),DETA(10),VIM(10),I1(10)
                5,I2(10),KV(10),FLM1(10),FLM2(10),SAV(10),FLIM2(10),PI(10),COU(10),
                6COR(10),TMUI(10),TMC1I(10),TMC2I(10),TCI(10),ICAN(10),SPRI(10),VR(
                710),
                8X(100),              VOL1(100),VOL2(100),VCL(100),BE(100),BE1(10
                90),BE2(100),AL1(100),AL2(100),AL22(100),AB2(100),BL1(100),BL2(100)
                A,B11(100),BI2(100),EP1(100),EP2(100),TO,            DER1(100),D
                BER2(100),DEM1(100),DEM2(100),SORM(100),SFI(100),SFI1(100),C(10,100
                C)
ISN 0005         COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                2,21,10)
ISN 0006         COMMON/CDAT/DATA(3500)
ISN 0007         DIMENSION ALFA(16),ITIPO(10),POWER(10)
ISN 0008         PINT=0.                                                        COS70050
ISN 0009         DO 9001 I=1,3500
ISN 0010    9001 DATA(I)=0.0
ISN 0011     110 READ (5,20)LAST,ALFA                                          COS70060
ISN 0012      20 FORMAT (I6,16A4)
ISN 0013         WRITE (6,23)                                                  COS70080
ISN 0014      23 FORMAT (1H1,35X,20HCOSTANZA  CILINDRICO//)                    COS70090
ISN 0015         WRITE (6,22)ALFA                                             COS70100
ISN 0016      22 FORMAT (1H0,30X,16A4//////)
ISN 0017         CALL AZER
ISN 0018     100 READ(5,101)JKLM,K1,K2,(DATA(I),I=K1,K2)
ISN 0019     101 FORMAT(2I6,I12/(6E12.8))
ISN 0020         WRITE (6,102)(I,DATA(I),I=K1,K2)                             COS70140
ISN 0021     102 FORMAT (6(I5,E14.6))                                         COS70150
ISN 0022         IF(JKLM.GE.0)GOTO 100
ISN 0024         PINT=0.0                                                     COS70180
ISN 0025         TO=0.0
ISN 0026         IT=0
ISN 0027         DELT=DATA(2)
ISN 0028         SI=DATA(3)
ISN 0029         IMAX=DATA(4)&0.0001                                          COS70220
ISN 0030         NREG=DATA(5)&0.0001                                          COS70230
ISN 0031         NRIT=DATA(6)&0.0001                                          COS70240
ISN 0032         BU=DATA(7)
ISN 0033         IDST=DATA(8)&0.0001                                          COS70260
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```
ISN 0034          ITCR=DATA(9)&0.0001                    COS70270
ISN 0035          NCAN=DATA(10)&0.1
ISN 0036          KPC=DATA(11)&0.1
ISN 0037          DT=DELT*FLOAT(KPC)                     COS70340
ISN 0038          KTME1=DATA(12)&0.1
ISN 0039          KMA1=DATA(13)&0.1
ISN 0040          KTE=1                                  COS70380
ISN 0041          KMAP=0                                 COS70390
ISN 0042          KTMED=0                                COS70400
ISN 0043          KCAN=0                                 COS70410
ISN 0044          DO 104 I=1,NRIT                        COS70420
ISN 0045          BETA(I)=DATA(I&30)                     COS70430
ISN 0046    104   DL(I)=DATA(I&40)                       COS70440
ISN 0047          DO 105 I=1,NREG                        COS70450
ISN 0048          I1(I)=DATA(I&60)&0.0001                COS70460
ISN 0049          I2(I)=DATA(I&61)&0.0001                COS70470
ISN 0050    105   CONTINUE                               COS70480
ISN 0051          IDF=80                                 COS70490
ISN 0052          DO 107 M=1,NREG                        COS70500
ISN 0053          D1(M)=DATA(IDF&1)
ISN 0054          SR(M)=DATA(IDF&2)
ISN 0055          P(M)=DATA(IDF&3)
ISN 0056          SF1(M)=DATA(IDF&4)
ISN 0057          W(M)=DATA(IDF&5)
ISN 0058          SOR(M)=DATA(IDF&6)
ISN 0059          D2(M)=DATA(IDF&7)
ISN 0060          SA(M)=DATA(IDF&8)
ISN 0061          SPR(M)=DATA(IDF&9)
ISN 0062          SP(M)=SPR(M)
ISN 0063          SF(M)=DATA(IDF&10)
ISN 0064          V(M)=DATA(IDF&11)
ISN 0065          ICAN(M)=DATA(IDF&12)
ISN 0066          IDF=IDF&12                             COS70630
ISN 0067    107   CONTINUE                               COS70640
ISN 0068          DO 108 I=1,IMAX                        COS70650
ISN 0069          AB2(I)=0.                              COS70660
ISN 0070    108   X(I)=DATA(I&200)                       COS70670
ISN 0071          X(1)=-X(2)                             COS70680
ISN 0072          P1(IMAX)=0.                            COS70690
ISN 0073          P2(IMAX)=0.                            COS70700
ISN 0074          P1(1)=P1(2)                            COS70710
ISN 0075          P2(1)=P2(2)                            COS70720
ISN 0076          SBETA=0.                               COS70730
ISN 0077          IF(NRIT.LE.0)GOTO 103
ISN 0079          DO 800 K=1,NRIT
ISN 0080    800   DETA(K)=BETA(K)/DL(K)
ISN 0081    103   CONTINUE                               COS70170
ISN 0082          IM1=IMAX-1                             COS70780
ISN 0083          NK=IMAX-2                              COS70790
ISN 0084          DO16I=2,IM1
```

```
ISN 0085        BE(I)=(X(I)&(X(I&1)-X(I))/2.)/(X(I&1)-X(I))           COS70810
ISN 0086        VOL1(I)=(X(I)&(X(I&1)-X(I))/4.)*(X(I&1)-X(I))/2.      COS70820
ISN 0087     16 VOL2(I)=(X(I)-(X(I)-X(I-1))/4.)*(X(I)-X(I-1))/2.      COS70830
ISN 0088        VOL2(IMAX)=(X(IMAX)-(X(IMAX)-X(IM1))/4.)*(X(IMAX)-X(IM1))/2.
ISN 0089        VOL(2)=((X(2)&X(3))/2.)**2*3.1416                     COS70840
ISN 0090        DO 17 I=3,IM1                                         COS70850
ISN 0091     17 VOL(I)=(VOL1(I)&VOL2(I))*6.2832                       COS70860
ISN 0092        VOLT=0.                                              COS70870
ISN 0093        DO 8 I=2,IM1                                          COS70880
ISN 0094      8 VOLT=VOLT&VOL(I)                                      COS70890
ISN 0095        VOLT=VOLT&6.2832*VOL2(IMAX)                           COS70900
ISN 0096        DO 300 M=1,NREG
ISN 0097        IS=I1(M)&1
ISN 0098        ID=I2(M)-1
ISN 0099        VOLO=6.2832*VOL1(IS-1)
ISN 0100        DO 301 I=IS,ID
ISN 0101    301 VOLO=VOLO&VOL(I)
ISN 0102    300 VR(M)=VOLO&6.2832*VOL2(ID&1)
ISN 0103        CALL MAT                                              COS70910
ISN 0104     31 DO 33 I=1,IM1                                         COS70920
ISN 0105        P1(I)=SI                                              COS70930
ISN 0106     33 P2(I)=SI                                              COS70940
ISN 0107        CALL INIZ                                             COS70950
ISN 0108        CALL STAMPA(2)                                        COS70960
ISN 0109        IF (ITCR)35,35,34                                     COS70970
ISN 0110     34 CALL CRITIC                                           COS70980
ISN 0111        CALL STAMPA(2)                                        COS71010
ISN 0112     35 CALL STAMPA(3)                                        COS71020
ISN 0113        IF (NCAN)1200,1200,1201                               COS71030
ISN 0114   1201 CONTINUE                                              COS71040
ISN 0115        CALL OCAN(ITIPO)                                      COS71050
ISN 0116        DO 1008 M=1,NREG                                      COS71060
ISN 0117        POWER(M)=DATA(M&20)                                   COS71220
ISN 0118        ID=I2(M)-1                                            COS71070
ISN 0119        IS=I1(M)&1                                            COS71080
ISN 0120        VOLO=6.2832*VOL1(IS-1)                                COS71090
ISN 0121        FL2=P2(IS-1)*VOLO                                     COS71100
ISN 0122        FL1=P1(IS-1)*VOLO
ISN 0123        DO 1050 I=IS,ID                                       COS71110
ISN 0124        FL2=FL2&P2(I)*VOL(I)                                  COS71130
ISN 0125        FL1=FL1&P2(I)*VOL(I)
ISN 0126   1050 CONTINUE                                              COS71140
ISN 0127        FLM1(M)=(FL1&P1(ID&1)*6.2832*VOL2(ID&1))/VR(M)
ISN 0128        FLM2(M)=(FL2&P2(ID&1)*6.2832*VOL2(ID&1))/VR(M)
ISN 0129        FLIM2(M)=POWER(M)/(SF1(M)*FLM1(M)&SF(M)*FLM2(M))
ISN 0130        PI(M)=P(M)                                            COS71170
ISN 0131        SPRI(M)=SPR(M)                                        COS71180
ISN 0132   1008 CONTINUE                                              COS71190
ISN 0133        N=0                                                   COS71200
ISN 0134        DO 1009 M=1,NREG                                      COS71210
```

```
ISN 0135            IF (ICAN(M))1009,1009,1010                                    COS71230
ISN 0136       1010 N=N&1                                                         COS71240
ISN 0137            NSEL=ITIPO(N)                                                 COS71250
ISN 0138            GO TO (1100,1101),NSEL                                        COS71260
ISN 0139       1100 CALL CANCIL(0.0,N,NS,NP3,TO,1.0,POWER(M))                     COS71270
ISN 0140            GO TO 1103                                                    COS71280
ISN 0141       1101 CALL CANSL(0.0,N,NS,NP3,TO,1.0,POWER(M))                      COS71290
ISN 0142       1103 CONTINUE                                                      COS71300
ISN 0143            TMUI(M)=TMED(N,1)                                             COS71310
ISN 0144            TMC1I(M)=TMED(N,2)                                            COS71320
ISN 0145            TMC2I(M)=TMED(N,3)                                            COS71330
ISN 0146            TCI(M)=TMED(N,4)                                              COS71340
ISN 0147       1009 CONTINUE                                                      COS71350
ISN 0148            DO 1020 M=1,NCAN                                              COS71360
ISN 0149            COU(M)=DATA(M&1300)                                           COS71370
ISN 0150       1020 COR(M)=DATA(M&1310)                                          COS71380
ISN 0151       1200 CONTINUE                                                      COS71390
ISN 0152            DELT=DATA(1)                                                  COS70190
ISN 0153            DO 80 K=1,NRIT                                                COS70740
ISN 0154            DLDT(K)=DL(K)*DELT                                            COS70750
ISN 0155            DETA(K)=BETA(K)*DELT                                          COS70760
ISN 0156         80 SBETA=SBETA&BETA(K)                                           COS70770
ISN 0157            CALL MAT                                                      COS70990
ISN 0158            CALL TEST
ISN 0159            KS=0
ISN 0160            KST=1851                                                      COS71400
ISN 0161       1000 CONTINUE                                                      COS71410
ISN 0162            KTP=DATA(KST)&0.0001                                          COS71420
ISN 0163            IF (KTP)106,106,127                                           COS71430
ISN 0164        127 I1P=DATA(KST&1)&0.0001                                        COS71440
ISN 0165            IS1=DATA(KST&2)&0.0001                                        COS71450
ISN 0166            I2P=DATA(KST&3)&0.0001                                        COS71460
ISN 0167            IS2=DATA(KST&4)&0.0001                                        COS71470
ISN 0168            DO 13 KK=1,KTP,I2P                                            COS71480
ISN 0169            DO 14 LL=1,I2P,I1P                                            COS71490
ISN 0170            DO 15 MM=1,I1P                                                COS71500
ISN 0171            IT=IT&1                                                       COS71510
ISN 0172            TO=DELT*FLOAT(IT)                                             COS71520
ISN 0173            IF (NCAN)1011,1011,1203
ISN 0174       1203 CONTINUE                                                      COS71540
ISN 0175            KCAN=KCAN&1                                                   COS71550
ISN 0176            IF (KCAN-KPC)1011,1012,1012                                   COS71560
ISN 0177       1012 KCAN=0                                                        COS71570
ISN 0178            N=0                                                           COS71580
ISN 0179            KTMED=KTMED&1                                                 COS71590
ISN 0180            DO 1013 MR=1,NREG                                             COS71600
ISN 0181            IF (ICAN(MR))1013,1013,1015                                   COS71610
ISN 0182       1015 ID=I2(MR)-1                                                   COS71620
ISN 0183            IS=I1(MR)&1                                                   COS71630
ISN 0184            VOLO=6.2832*VOL1(IS-1)                                        COS71640
                                                                                 COS71650
```

```
ISN 0185          FL1=P1(IS-1)*VOLO
ISN 0186          FL2=P2(IS-1)*VOLO
ISN 0187          DO 1014 I=IS,ID                                        COS71660
ISN 0188          FL1=FL1&P2(I)*VOL(I)                                   COS71670
ISN 0189     1014 FL2=FL2&P2(I)*VOL(I)                                   COS71680
ISN 0190          FLM1(MR)=(FL1&P1(ID&1)*6.2832*VOL2(ID&1))/VR(MR)
ISN 0191          FLM2(MR)=(FL2&P2(ID&1)*6.2832*VOL2(ID&1))/VR(MR)
ISN 0192          POWER(MR)=(SF1(MR)*FLM1(MR)&SF(MR)*FLM2(MR))/FLIM2(MR)
ISN 0193          N=N&1                                                  COS71710
ISN 0194          NSEL=ITIPO(N)                                          COS71720
ISN 0195          GO TO (1104,1105),NSEL                                 COS71730
ISN 0196     1104 CALL CANCIL(1.0,N,NS,NP3,TC,DT,POWER(MR))             COS71740
ISN 0197          GO TO 1106                                            COS71750
ISN 0198     1105 CALL CANSL(1.0,N,NS,NP3,TC,DT,POWER(MR))             COS71760
ISN 0199     1106 CONTINUE                                              COS71770
ISN 0200          P(MR)=PI(MR)&PI(MR)*COU(N)*(TMED(N,1)-TMUI(MR))       COS71780
ISN 0201          SPR(MR)=SPRI(MR)-SA(MR)*COR(N)*(TMED(N,4)-TCI(MR))    COS71790
ISN 0202     1013 CONTINUE                                              COS71800
ISN 0203          CALL MAT                                              COS71810
ISN 0204          IF (KTMED-KTME1)1011,1107,1107                        COS71820
ISN 0205     1107 KTMED=0                                               COS71830
ISN 0206          WRITE (6,1150)TO                                      COS71840
ISN 0207     1150 FORMAT (1H0///,21H   TEMPERATURE MEDIE   ,5X,4HTO =F10.4///,4X,1HM,  COS71850
                 110X,2HTU,12X,3HTG1,12X,3HTG2,13X,2HTR///)             COS71860
ISN 0208          DO 1152 M=1,NCAN                                      COS71870
ISN 0209          WRITE (6,1151)M,(TMED(M,I),I=1,4)                     COS71880
ISN 0210     1151 FORMAT (I5,4F15.2)                                    COS71890
ISN 0211     1152 CONTINUE                                              COS71900
ISN 0212          KMAP=KMAP&1                                           COS71910
ISN 0213          IF (KMAP-KMA1)1011,1108,1108                          COS71920
ISN 0214     1108 KMAP=0                                                COS71930
ISN 0215          DO 1109 N=1,NCAN                                      COS71940
ISN 0216          WRITE (6,1110)N,ITIPO(N),TO                          COS71950
ISN 0217     1110 FORMAT (1H0////9H CANALE NI3,5X,4HTIPOI2,5X,4HTC =F8.3//)  COS71960
ISN 0218          DO 1111 J=1,NS                                        COS71970
ISN 0219     1111 WRITE (6,1112)J,(TP(K,J,N),K=1,NP3)                   COS71980
ISN 0220     1112 FORMAT (1H0,I5,10F10.3)                               COS71990
ISN 0221     1109 CONTINUE                                              COS72000
ISN 0222     1011 CONTINUE                                              COS72010
ISN 0223          CALL BARRE                                            COS72020
ISN 0224          DO 12 I=1,IMAX                                        COS72030
ISN 0225          AL22(I)=AL2(I)&AB2(I)                                 COS72040
ISN 0226          EP2(I)=BE2(I-1)&BE2(I)&AL22(I)*VOL1(I)&AL22(I-1)*VOL2(I)  COS72050
ISN 0227          SRIT=0.                                               COS72060
ISN 0228          IF (NRIT)81,81,82                                     COS72070
ISN 0229       82 CONTINUE                                              COS72080
ISN 0230          DO 73 K=1,NRIT                                        COS72090
ISN 0231       73 SRIT=SRIT&DL(K)*C(K,I)                                COS72100
ISN 0232       81 CONTINUE                                              COS72110
ISN 0233          TN1(I)=SRIT*(VOL1(I)&VOL2(I))&DER1(I)*P1(I)&SORM(I)   COS72120
```

```
ISN 0234        12 TN2(I)=DER2(I)*P2(I)                                              COS72130
ISN 0235           CALL FLUSSI                                                       COS72140
ISN 0236           PINT=PINT&PM2*DELT                                                COS72150
ISN 0237           DO 30 I=2,IMAX                                                    COS72160
ISN 0238           DO 74 K=1,NRIT                                                    COS72170
ISN 0239        74 C(K,I)=C(K,I)-DLDT(K)*C(K,I)&DETA(K)*(SFI(I)*P2(I)&SFI1(I)*P1(I))
ISN 0240        30 CONTINUE                                                          COS72190
ISN 0241           DO 75 K=1,NRIT                                                    COS72200
ISN 0242        75 C(K,1)=C(K,2)                                                     COS72210
ISN 0243           IF (KTE)120,120,121                                              COS72220
ISN 0244       121 CALL TEST                                                         COS72230
ISN 0245       120 CONTINUE                                                          COS72240
ISN 0246        15 CONTINUE                                                          COS72250
ISN 0247           CALL STAMPA(IS1)                                                  COS72260
ISN 0248        14 CONTINUE                                                          COS72270
ISN 0249           CALL STAMPA(IS2)                                                  COS72280
ISN 0250        13 CONTINUE                                                          COS72290
ISN 0251           KST=KST&6                                                         COS72300
ISN 0252           GO TO 1000                                                        COS72310
ISN 0253       106 CALL STAMPA(2)                                                    COS72320
ISN 0254           IF (LAST)110,110,9000                                            COS72330
ISN 0255      9000 STOP
ISN 0256           END                                                              COS72350
```

```
                    C       FLUS
ISN 0002                    SUBROUTINE FLUSSI                                          OS20010
                    C       FLUS
ISN 0003                    REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004                    COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005                    REAL*8 AA1,AA2,BB1,BB2,WL11,WL12,WL21,WL22,W11,W12,W21,W22,WW
ISN 0006                    DIMENSION AA1(2,100),AA2(2,100),BB1(100),BB2(100)
ISN 0007                    COMMON/COMN/KBA,KTE,KBAR,KS,NREG,IDST,ITCR,IT,LF,L1,IMAX,KBI,NRIT,
                           1IM1,NK,    SI,REP,SPCR,SBETA,PER,PINT,BU,VOLT,                SPRG,DAP
                           2F,DELT,DLD,DLM,
                           3D1(10),D2(10),SF(10),SR(10),SA(10),SPR(10),SF1(10),SOR(10),W(10),V
                           4(10),SP(10),P(10),BETA(10),DL(10),DLDT(10),DETA(10),VIM(10),I1(10)
                           5,I2(10),KV(10),FLM1(10),FLM2(10),SAV(10),FLIM2(10),PI(10),CNU(10),
                           6COR(10),TMUI(10),TMC1I(10),TMC2I(10),TCI(10),ICAN(10),SPRI(10),VR(
                           710),
                           8X(100),                  VOL1(100),VOL2(100),VOL(100),BE(100),BE1(10
                           90),BE2(100),AL1(100),AL2(100),AL22(100),AB2(100),BL1(100),BL2(100)
                           A,BI1(100),BI2(100),EP1(100),EP2(100),TO,                DER1(100),D
                           BER2(100),DEM1(100),DEM2(100),SORM(100),SFI(100),SFI1(100),C(10,100
                           C)
ISN 0008                    COMMON/CDAT/DATA(3500)
ISN 0009                    PMPT=PM2
ISN 0010                    AA1(1,1)=0.0
ISN 0011                    AA1(2,1)=0.0
ISN 0012                    AA2(1,1)=0.0
ISN 0013                    AA2(2,1)=0.0
ISN 0014                    BB1(1)=0.0
ISN 0015                    BB2(1)=0.0
ISN 0016                    DO 1 I=2,IM1
ISN 0017                    WL11=EP1(I)-BE1(I-1)*AA1(1,I-1)
ISN 0018                    WL12=-BI1(I)-BE1(I-1)*AA1(2,I-1)
ISN 0019                    WL21=-BI2(I)-BE2(I-1)*AA2(1,I-1)
ISN 0020                    WL22=EP2(I)-BE2(I-1)*AA2(2,I-1)
ISN 0021                    WW=WL11*WL22-WL12*WL21
ISN 0022                    W11=WL22/WW
ISN 0023                    W12=-WL12/WW
ISN 0024                    W21=-WL21/WW
ISN 0025                    W22=WL11/WW
ISN 0026                    AA1(1,I)=W11*BE1(I)
ISN 0027                    AA1(2,I)=W12*BE2(I)
ISN 0028                    AA2(1,I)=W21*BE1(I)
ISN 0029                    AA2(2,I)=W22*BE2(I)
ISN 0030                    WL11=TN1(I)&BE1(I-1)*BB1(I-1)
ISN 0031                    WL21=TN2(I)&BE2(I-1)*BB2(I-1)
ISN 0032                    BB1(I)=W11*WL11&W12*WL21
ISN 0033                    BB2(I)=W21*WL11&W22*WL21
ISN 0034                  1 CONTINUE
ISN 0035                    P1(IM1)=BB1(IM1)
ISN 0036                    P2(IM1)=BB2(IM1)
```

```
ISN 0037          PM2=P2(IM1)*VOL(IM1)
ISN 0038          PM1=P1(IM1)*VOL(IM1)
ISN 0039          I=IM1
ISN 0040          DO 2 J=2,NK
ISN 0041          I=I-1
ISN 0042          P1(I)=AA1(1,I)*P1(I&1)&AA1(2,I)*P2(I&1)&BB1(I)
ISN 0043          P2(I)=AA2(1,I)*P1(I&1)&AA2(2,I)*P2(I&1)&BB2(I)
ISN 0044          PM2=PM2&P2(I)*VOL(I)
ISN 0045        2 PM1=PM1&P1(I)*VOL(I)
ISN 0046          PM2=PM2/VOLT
ISN 0047          PM1=PM1/VOLT
ISN 0048          P1(1)=P1(2)
ISN 0049          P2(1)=P2(2)
ISN 0050          RETURN
ISN 0051          END
```

COS70220
COS70420

```
            C       MAT
ISN 0002            SUBROUTINE MAT                                                    OS20010
            C       MAT
ISN 0003            REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004            COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005            DIMENSION SORD(100)
ISN 0006            COMMON/CDAT/DATA(3500)
ISN 0007            COMMON/COMN/KBA,KTE,KBAR,KS,NREG,IDST,ITCR,IT,LF,L1,IMAX,KBI,NRIT,
                   1IM1,NK,     SI,REP,SPCR,SBETA,PER,PINT,BU,VOLT,                 SPRG,DAP
                   2F,DELT,DLD,DLM,
                   3D1(10),D2(10),SF(10),SR(10),SA(10),SPR(10),SF1(10),SOR(10),W(10),V
                   4(10),SP(10),P(10),BETA(10),DL(10),DLDT(10),DETA(10),VIM(10),I1(10)
                   5,I2(10),KV(10),FLM1(10),FLM2(10),SAV(10),FLIM2(10),PI(10),COU(10),
                   6COR(10),TMUI(10),TMC1I(10),TMC2I(10),TCI(10),ICAN(10),SPRI(10),VR(
                   710),
                   8X(100),                  VOL1(100),VOL2(100),VOL(100),BE(100),BE1(10
                   90),BE2(100),AL1(100),AL2(100),AL22(100),AB2(100),BL1(100),BL2(100)
                   A,BI1(100),BI2(100),EP1(100),EP2(100),TO,                 DER1(100),D
                   BER2(100),DEM1(100),DEM2(100),SORM(100),SFI(100),SFI1(100),C(10,100
                   C)
ISN 0008            DO 1 M=1,NREG                                                     COS70040
ISN 0009            ID=I2(M)-1                                                        COS70050
ISN 0010            IS=I1(M)                                                          COS70060
ISN 0011            D1M=D1(M)                                                         COS70070
ISN 0012            D2M=D2(M)                                                         COS70080
ISN 0013            SRM=SR(M)
ISN 0014            SFM=SF(M)
ISN 0015            SAM=SA(M)                                                         COS70110
ISN 0016            SPRM=SPR(M)                                                       COS70120
ISN 0017            SORR=SOR(M)                                                       COS70130
ISN 0018            SF1M=SF1(M)
ISN 0019            WM=W(M)                                                           COS70150
ISN 0020            VM=V(M)                                                           COS70160
ISN 0021            PM=P(M)                                                           COS70170
                                                                                      COS70180
            C                                                                         COS70190
            C       DO 2 I=IS,ID                                                      COS70200
ISN 0022            DO 2 I=IS,ID                                                      COS70210
ISN 0023            SORD(I)=SORR
ISN 0024            AL1(I)=SRM&D1M*BU&1.0/(WM*DELT)-SF1M*(1.0-SBETA)
ISN 0025            AL2(I)=SAM&SPRM&D2M*BU&1./(VM*DELT)                               COS70230
ISN 0026            BL1(I)=SFM*(1.0-SBETA)
ISN 0027            BL2(I)=PM*SRM
ISN 0028            DEM1(I)=1./(WM*DELT)                                              COS70260
ISN 0029            DEM2(I)=1./(VM*DELT)                                              COS70270
ISN 0030            TN2(I)=SFM
ISN 0031            TN1(I)=SF1M
ISN 0032            BE1(I)=D1M*BE(I)                                                  COS70340
ISN 0033            BE2(I)=D2M*BE(I)                                                  COS70350
ISN 0034          2 CONTINUE                                                         COS70360
```

```
ISN 0035          1 CONTINUE                                                          COS70370
                C                                                                     COS70380
ISN 0036            DO 3I=2,IM1
ISN 0037            EP1(I)=BE1(I-1)&BE1(I)&AL1(I)*VOL1(I)&AL1(I-1)*VOL2(I)            COS70400
ISN 0038            BI1(I)=BL1(I)*VOL1(I)&BL1(I-1)*VOL2(I)                            COS70410
ISN 0039            BI2(I)=BL2(I)*VOL1(I)&BL2(I-1)*VOL2(I)                            COS70420
ISN 0040            DER1(I)=DEM1(I)*VOL1(I)&DEM1(I-1)*VOL2(I)                         COS70430
ISN 0041            DER2(I)=DEM2(I)*VOL1(I)&DEM2(I-1)*VOL2(I)                         COS70440
ISN 0042            SORM(I)=SORD(I)*VOL1(I)&SORD(I-1)*VOL2(I)                         COS70450
ISN 0043            SFI1(I)=(TN1(I)*VOL1(I)&TN1(I-1)*VOL2(I))/(VOL1(I)&VOL2(I))
ISN 0044            SFI(I)=(TN2(I)*VOL1(I)&TN2(I-1)*VOL2(I))/(VOL1(I)&VOL2(I))
ISN 0045          3 CONTINUE                                                          COS70510
ISN 0046            RETURN                                                            COS70520
ISN 0047            END                                                              COS70530
```

```
            C       INIZ
ISN 0002            SUBROUTINE INIZ                                                    0S20010
ISN 0003            REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004            COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005            COMMON/COMN/KBA,KTE,KBAR,KS,NREG,IDST,ITCR,IT,LF,LI,IMAX,KBI,NRIT,
                   1IM1,NK,    SI,REP,SPCR,SBETA,PER,PINT,BU,VOLT,              SPRG,DAP
                   2F,DELT,DLD,DLM,
                   3D1(10),D2(10),SF(10),SR(10),SA(10),SPR(10),SF1(10),SOR(10),W(10),V
                   4(10),SP(10),P(10),BETA(10),DL(10),DLDT(10),DETA(10),VIM(10),I1(10)
                   5,I2(10),KV(10),FLM1(10),FLM2(10),SAV(10),FLIM2(10),PI(10),COU(10),
                   6COR(10),TMUI(10),TMC1I(10),TMC2I(10),TCI(10),TCAN(10),SPRI(10),VR(
                   710),
                   8X(100),                  VOL1(100),VOL2(100),VOL(100),BE(100),BE1(10
                   90),BE2(100),AL1(100),AL2(100),AL22(100),AB2(100),BL1(100),BL2(100)
                   A,BI1(100),BI2(100),EP1(100),EP2(100),TO,            DER1(100),D
                   BER2(100),DEM1(100),DEM2(100),SORM(100),SFI(100),SFI1(100),C(10,100
                   C)
ISN 0006            COMMON/CDAT/DATA(3500)
ISN 0007            DO 2 I=1,IMAX                                                     COS70030
ISN 0008          2 EP2(I)=BE2(I-1)&BE2(I)&AL2(I)*VOL1(I)&AL2(I-1)*VOL2(I)            COS70040
ISN 0009            DO 1 LK=1,IDST                                                    COS70050
ISN 0010            DO 7 I=1,IMAX                                                     COS70060
ISN 0011            TN1(I)=DER1(I)*P1(I)&SORM(I)
ISN 0012          7 TN2(I)=DER2(I)*P2(I)                                             COS70140
ISN 0013            CALL FLUSSI                                                       COS70150
ISN 0014            IF(SI.LE.0.0)GOTO 10
ISN 0016            FN=SI/PM2
ISN 0017            DO 3 I=1,IMAX                                                     COS70200
ISN 0018            P2(I)=P2(I)*FN                                                    COS70210
ISN 0019          3 P1(I)=P1(I)*FN                                                    COS70220
ISN 0020          1 CONTINUE                                                          COS70420
ISN 0021            PMPT=FN
ISN 0022            PM1=PM1*FN
ISN 0023            PM2=SI
ISN 0024         10 CONTINUE
ISN 0025            IF(NRIT.LE.0) RETURN
ISN 0027            DO 6 I=1,IMAX                                                     COS70370
ISN 0028            DO 11 K=1,NRIT                                                    COS70380
ISN 0029         11 C(K,I)=DETA(K)*(SFI(I)*P2(I)&SFI1(I)*P1(I))
ISN 0030          6 CONTINUE                                                          COS70410
ISN 0031            RETURN                                                            COS70500
ISN 0032            END                                                              COS70510
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```
         C      CRIT
ISN 0002        SUBROUTINE CRITIC                                        OS20010
ISN 0003        REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004        COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005        COMMON/COMN/KBA,KTE,KBAR,KS,NREG,IDST,ITCR,IT,LF,L1,IMAX,KBI,NRIT,
               1IM1,NK,     SI,REP,SPCR,SBETA,PER,PINT,BU,VOLT,               SPRG,DAP
               2F,DELT,DLD,DLM,
               3D1(10),D2(10),SF(10),SR(10),SA(10),SPR(10),SF1(10),SOR(10),W(10),V
               4(10),SP(10),P(10),BETA(10),DL(10),DLDT(10),DETA(10),VIM(10),I1(10)
               5,I2(10),KV(10),FLM1(10),FLM2(10),SAV(10),FLIM2(10),PI(10),COU(10),
               6COR(10),TMUI(10),TMC1I(10),TMC2I(10),TCI(10),ICAN(10),SPRI(10),VR(
               710),
               8X(100),                 VOL1(100),VOL2(100),VOL(100),BE(100),BE1(10
               90),BE2(100),AL1(100),AL2(100),AL22(100),AB2(100),BL1(100),BL2(100)
               A,BI1(100),BI2(100),EP1(100),EP2(100),TO,                 DER1(100),D
               BER2(100),DEM1(100),DEM2(100),SORM(100),SFI(100),SFI1(100),C(10,100
               C)
ISN 0006        COMMON/CDAT/DATA(3500)
ISN 0007        DO 1 I=1,NREG                                            COS70040
ISN 0008      1 KV(I)=DATA(I&160C)                                      COS70050
ISN 0009        SPRG=DATA(1611)                                         COS70060
ISN 0010        DAPF=DATA(1612)                                         COS70070
ISN 0011        LF=DATA(1613)&0.0001                                    COS70080
ISN 0012        WRITE (6,204)                                           COS70090
ISN 0013    204 FORMAT (1H0///,15X,18H RICERCA CRITICITA)               COS70100
ISN 0014        WRITE (6,30)(KV(I),I=1,NREG)                            COS70110
ISN 0015     30 FORMAT (1H //////,22H  REGIONI AVVELENATE  ,7I10)       COS70120
ISN 0016        WRITE (6,31)SPRG,DAPF,LF,ITCR                           COS70130
ISN 0017     31 FORMAT (1H0///,10X,6HSPRG =E14.5,4X,6HDAPF =E14.5,4X,4HLF =I5,4X,  COS70140
               16HITCR =I5//////)                                       COS70150
ISN 0018        L1=0.                                                   COS70190
ISN 0019        SP1=0.                                                  COS70200
ISN 0020        SPCR=0.                                                 COS70210
         C                                                              COS70240
ISN 0021   1000 CONTINUE                                                COS70250
ISN 0022        L1=L1&1                                                 COS70260
ISN 0023        DO 4 M=1,NREG                                           COS70270
ISN 0024        KVM=KV(M)                                               COS70280
ISN 0025        IF (M-KVM)5,5,4                                         COS70290
ISN 0026      5 SPR(M)=SPCR&SP(M)
ISN 0027      4 CONTINUE                                                COS70310
ISN 0028        CALL MAT                                                COS70320
ISN 0029        DO 6 I=1,IMAX                                           COS70330
ISN 0030      6 EP2(I)=BE2(I-1)&BE2(I)&AL2(I)*VOL1(I)&AL2(I-1)*VOL2(I)  COS70340
ISN 0031        PMPC=PM2                                                COS70360
ISN 0032        DO 20 I=1,IMAX                                          COS70380
ISN 0033        TN1(I)=DER1(I)*P1(I)                                    COS70390
ISN 0034     20 TN2(I)=DER2(I)*P2(I)                                    COS70400
ISN 0035     77 CALL FLUSSI                                             COS70410
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```
ISN 0036          OP=(PM2-PMPC)/DELT
ISN 0037          REP=(DP*2.)/(PM2&PMPC)                                         COS70430
ISN 0038          IF (L1-1)14,14,15                                             COS70450
ISN 0039       14 CONTINUE                                                      COS70460
ISN 0040          SP1=SPCR                                                      COS70470
ISN 0041          REP1=REP                                                      COS70480
ISN 0042          SPCR=SPRG                                                     COS70490
ISN 0043          GO TO 1000                                                    COS70500
ISN 0044       15 DAP=ABS(REP)                                                  COS70510
ISN 0045          IF (DAPF-DAP)9,10,10                                          COS70520
ISN 0046        9 IF (LF-L1)10,10,11                                            COS70530
ISN 0047       11 TG=(SPCR-SP1)/(REP-REP1)                                      COS70540
ISN 0048          SP1=SPCR                                                      COS70550
ISN 0049          SPCR=SPCR-TG*REP                                             COS70560
ISN 0050          REP1=REP                                                      COS70570
ISN 0051          DELT=0.01/DAP
ISN 0052          IF(DELT.GT.1.0)DELT=1.0
ISN 0054          GO TO 1000                                                    COS70580
ISN 0055       10 CONTINUE
ISN 0056          WRITE (6,203)                                                 COS70640
ISN 0057      203 FORMAT (1H0///,5X,10HITERAZIONI,14X,3HPM2,14X,3HREP,11X,6HVELEND) COS70650
ISN 0058          WRITE (6,3)L1,PM2,REP,SPCR                                    COS70660
ISN 0059        3 FORMAT (1H ,I10,10X,3E16.5)                                   COS70670
ISN 0060          FN=SI/PM2
ISN 0061          DO 12 I=1,IMAX
ISN 0062          P1(I)=FN*P1(I)
ISN 0063       12 P2(I)=FN*P2(I)
ISN 0064          PMPT=FN*PMPT
ISN 0065          PM1=PM1*FN
ISN 0066          PM2=SI
ISN 0067          IF(NRIT.LE.0) RETURN
ISN 0069          DO 106 I=1,IMAX                                               COS70810
ISN 0070          DO 111 K=1,NRIT                                               COS70820
ISN 0071      111 C(K,I)=DETA(K)*(SFI(I)*P2(I)&SFI1(I)*P1(I))
ISN 0072      106 CONTINUE                                                      COS70850
ISN 0073          RETURN                                                        COS70870
ISN 0074          END                                                          COS70880
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
            C       BARR
ISN 0002            SUBROUTINE BARRE                                             OS20010
ISN 0003            REAL*8 PM1,PM2,PMPT,P1,P2,TM1,TN2
ISN 0004            COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005            COMMON/CDAT/DATA(3500)
ISN 0006            COMMON/COMN/KBA,KTE,KBAR,KS,NREG,IDST,ITCR,IT,LF,L1,IMAX,KBI,NRIT,
                   1IM1,NK,     ST,REP,SPCR,SBETA,PER,PINT,BU,VOLT,               SPRG,DAP
                   2F,DELT,DLD,DLM,
                   3D1(10),D2(10),SF(10),SR(10),SA(10),SPR(10),SF1(10),SQR(10),W(10),V
                   4(10),SP(10),P(10),BETA(10),DL(10),DLDT(10),DETA(10),VIM(10),I1(10)
                   5,I2(10),KV(10),FLM1(10),FLM2(10),SAV(10),FLIM2(10),PI(10),COU(10),
                   6COR(10),TMUI(10),TMC1I(10),TMC2I(10),TCI(10),ICAN(10),SPRI(10),VR(
                   710),
                   8X(100),                     VOL1(100),VOL2(100),VOL(100),BE(100),BE1(10
                   90),BE2(100),AL1(100),AL2(100),AL22(100),AB2(100),BLI(100),BL2(100)
                   A,BI1(100),BI2(100),EP1(100),EP2(100),TO,             DER1(100),D
                   BER2(100),DEM1(100),DEM2(100),SQRM(100),SFI(100),SFI1(100),C(10,100
                   C)
ISN 0007            DO 1 M=1,NREG
ISN 0008            IF(KV(M)&10)1,1,10
ISN 0009         10 CONTINUE
ISN 0010            IREG=(M-1)*60
ISN 0011            DO 2 K=1,30
ISN 0012            IPP=IREG&K
ISN 0013            TOAV=DATA(IPP&301)
ISN 0014            IF(TOAV-0.0000001)3,3,4
ISN 0015          3 VEL =DATA(IPP&330)
ISN 0016            KV(M)=-100
ISN 0017            GO TO 5
ISN 0018          4 IF(TO.GE.TOAV) GO TO 2
ISN 0020            VELAV=DATA(IPP&331)
ISN 0021            VELDI=DATA(IPP&330)
ISN 0022            TODI=DATA(IPP&300)
ISN 0023            VEL=VELDI&(VELAV-VELDI)*(TO-TODI)/(TOAV-TODI)
ISN 0024            GO TO 5
ISN 0025          2 CONTINUE
ISN 0026          5 IS=I1(M)
ISN 0027            ID=I2(M)-1
ISN 0028            DO 6 I=IS,ID
ISN 0029          6 AB2(I)=VEL
ISN 0030          1 CONTINUE
ISN 0031            RETURN
ISN 0032            END
```

```
          C      STAM
ISN 0002         SUBROUTINE STAMPA(IST)                                              OS20010
          C      STAM
ISN 0003         REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004         COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005         COMMON/COMN/KBA,KTE,KBAR,KS,NREG,IDST,ITCR,IT,LF,L1,IMAX,KBI,NRIT,
                1IM1,NK,     SI,REP,SPCR,SBETA,PER,PINT,BU,VOLT,                    SPRG,DAP
                2F,DELT,DLD,DLM,
                3D1(10),D2(10),SF(10),SR(10),SA(10),SPR(10),SF1(10),SOR(10),W(10),V
                4(10),SP(10),P(10),BETA(10),DL(10),DLDT(10),DETA(10),VIM(10),I1(10)
                5,I2(10),KV(10),FLM1(10),FLM2(10),SAV(10),FLIM2(10),PI(10),COU(10),
                6COR(10),TMU1(10),TMC11(10),TMC21(10),TC1(10),ICAN(10),SPR1(10),VR(
                710),
                8X(100),                    VOL1(100),VOL2(100),VOL(100),BE(100),BE1(10
                90),BE2(100),AL1(100),AL2(100),AL22(100),AB2(100),BL1(100),BL2(100)
                A,B11(100),B12(100),EP1(100),EP2(100),TO,                    DER1(100),D
                BER2(100),DEM1(100),DEM2(100),SORM(100),SF1(100),SF11(100),C(10,100
                C)
ISN 0006         COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                1SC(15,10),RO(15,10),OR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                2,21,10)
ISN 0007         COMMON/CDAT/DATA(3500)
ISN 0008         GO TO (10,20,30),IST                                               COS70030
ISN 0009     10  DP=(PM2-PMPT)/DELT                                                 COS70040
ISN 0010         PER=(PM2&PMPT)/(DP*2.)                                             COS70050
ISN 0011         WRITE (6,1)TO,PM1,PM2,PER                                          COS70060
ISN 0012      1  FORMAT (1HO////,4X,4HTO =,F10.5,4X,5HPM1 =,E12.5,4X,5HPM2 =,E12.5, COS70070
                14X,5HPER =,E12.5)                                                  COS70080
ISN 0013         GO TO 40                                                           COS70090
ISN 0014     20  DP=(PM2-PMPT)/DELT                                                 COS70100
ISN 0015         PER=(PM2&PMPT)/(DP*2.)                                             COS70110
ISN 0016         WRITE (6,2)TO,IT,PER,PINT
ISN 0017      2  FORMAT (1HO///////,4X,4HTO =,F10.5,3X,4HIT =,I6,4X,5HPER =,E12.5,  COS70130
                14X,6HPINT =,E12.5)
ISN 0018         WRITE (6,3)                                                        COS70150
ISN 0019      3  FORMAT (1H ///,15X,1HR,14X,2HP1,14X,2HP2,//)                       COS70160
ISN 0020         WRITE (6,4)(I,X(I),P1(I),P2(I),I=1,IMAX)                           COS70170
ISN 0021      4  FORMAT (1H ,I5,3E16.5)                                            COS70180
ISN 0022         WRITE (6,5)PM1,PM2                                                 COS70190
ISN 0023      5  FORMAT (1HO,10X,11HVALORI MEDI,2E16.5)                            COS70200
ISN 0024         IF (NRIT)40,40,21                                                  COS70210
ISN 0025     21  CONTINUE                                                           COS70220
ISN 0026         WRITE (6,9)                                                        COS70230
ISN 0027      9  FORMAT (1H ///,14X,2HC1,14X,2HC2,14X,2HC3,14X,2HC4,14X,2HC5,14X,2H COS70240
                1C6,//)                                                             COS70250
ISN 0028         DO 11 I=1,IMAX                                                     COS70260
ISN 0029     11  WRITE (6,12)I,(C(K,I),K=1,6)                                       COS70270
ISN 0030     12  FORMAT (I5,6E16.5)                                                 COS70280
ISN 0031         IF (NRIT-6)100,100,101                                            COS70290
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ISN 0032      101 WRITE (6,102)                                                    COS70300
ISN 0033      102 FORMAT (1H ///,14X,2HC7,14X,2HC8,14X,2HC9,14X,3HC10,//)          COS70310
ISN 0034          DO 111 I=1,IMAX                                                  COS70320
ISN 0035      111 WRITE (6,12)I,(C(K,I),K=7,NRIT)                                  COS70330
ISN 0036      100 CONTINUE                                                         COS70340
ISN 0037          GO TO 40                                                         COS70350
ISN 0038       30 DP=(PM2-PMPT)/DELT                                              COS70360
ISN 0039          PER=(PM2&PMPT)/(DP*2.)                                          COS70370
ISN 0040          DO 8 M=1,NREG                                                    COS70380
ISN 0041          ID=I2(M)-1                                                       COS70390
ISN 0042          IS=I1(M)&1                                                       COS70400
ISN 0043          VOLO=6.2832*VOL1(IS-1)                                           COS70410
ISN 0044          FL1=P1(IS-1)*VOLO                                                COS70420
ISN 0045          FL2=P2(IS-1)*VOLO                                                COS70430
ISN 0046          DO 50 I=IS,ID                                                    COS70440
ISN 0047          FL1=FL1&P1(I)*VOL(I)                                             COS70460
ISN 0048       50 FL2=FL2&P2(I)*VOL(I)                                            COS70470
ISN 0049          FLM1(M)=(FL1&P1(ID&1)*6.2832*VOL2(ID&1))/VR(M)
ISN 0050          FLM2(M)=(FL2&P2(ID&1)*6.2832*VOL2(ID&1))/VR(M)
ISN 0051        8 SAV(M)=AB2(ID)                                                   COS70510
ISN 0052          WRITE (6,1)TO,PM1,PM2,PER                                        COS70520
ISN 0053          WRITE (6,6)SAV,FLM1,FLM2                                         COS70530
ISN 0054        6 FORMAT (13HOVELENI BARRE/10E12.4/9X,4HFLM1/10E12.4/9X,4HFLM2/10E12 COS70540
                 1.4)                                                              COS70550
ISN 0055       40 CONTINUE                                                         COS70560
ISN 0056          RETURN                                                          COS70570
ISN 0057          END                                                             COS70580
```

```
            C       DCAN
ISN 0002            SUBROUTINE DCAN(ITIPO)                                              OS20010
            C       DCAN
ISN 0003            DIMENSION DRU(10),RP(10),ITIPO(10)
ISN 0004            COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                   1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                   2,21,10)
ISN 0005            COMMON/CDAT/DATA(3500)
ISN 0006            NCAN=DATA(10)&0.1
ISN 0007            DO 71 L1=1,NCAN                                                     COS70020
ISN 0008            NC=30*(L1-1)                                                        COS70030
ISN 0009            ITIPO(L1)=DATA(NC&2530)&0.0001                                      COS70040
ISN 0010            MZ(L1)=DATA(NC&2501)&0.0001                                         COS70050
ISN 0011            MSV(L1)=DATA(NC&2502)&0.0001                                        COS70060
ISN 0012            N=MZ(L1)                                                            COS70070
ISN 0013            NSV=MSV(L1)                                                         COS70080
ISN 0014            NS=NSV&1                                                            COS70090
ISN 0015            NP1=N&1                                                             COS70100
ISN 0016            NP2=N&2                                                             COS70110
ISN 0017            NP3=N&3                                                             COS70120
ISN 0018            DO 62 J=1,NP3                                                       COS70130
ISN 0019         62 TP(J,1,L1)=0.                                                       COS70140
ISN 0020            FN=FLOAT(N)                                                         COS70150
ISN 0021            DRU(L1)=DATA(NC&2503)/(2.*FN)                                       COS70160
ISN 0022            DO 12 I=1,N                                                         COS70170
ISN 0023         12 DR(I,L1)=DRU(L1)                                                    COS70180
ISN 0024            DR(NP1,L1)=DATA(NC&2504)                                            COS70190
ISN 0025            DR(NP2,L1)=DATA(NC&2505)                                            COS70200
ISN 0026            DR(NP3,L1)=DATA(NC&2506)                                            COS70210
ISN 0027            R(1,L1)=DR(1,L1)                                                    COS70220
ISN 0028            DO 13 I=2,NP3                                                       COS70230
ISN 0029         13 R(I,L1)=R(I-1,L1)&DR(I,L1)                                          COS70240
ISN 0030            DO 14 I=1,N                                                         COS70250
ISN 0031            RO(I,L1)=DATA(NC&2507)                                              COS70260
ISN 0032            SC(I,L1)=DATA(NC&2511)                                              COS70270
ISN 0033         14 VL(I,L1)=2.*DATA(NC&2515)/(DR(I,L1)&DR(I&1,L1))                     COS70280
ISN 0034            RO(NP1,L1)=DATA(NC&2508)                                            COS70290
ISN 0035            RO(NP2,L1)=DATA(NC&2509)                                            COS70300
ISN 0036            RO(NP3,L1)=DATA(NC&2510)                                            COS70310
ISN 0037            SC(NP1,L1)=DATA(NC&2512)                                            COS70320
ISN 0038            SC(NP2,L1)=DATA(NC&2513)                                            COS70330
ISN 0039            SC(NP3,L1)=DATA(NC&2514)                                            COS70340
ISN 0040            RU(L1)=DR(N,L1)/(2.*DATA(NC&2515))                                  COS70350
ISN 0041            RP(L1)=DR(NP1,L1)/(2.*DATA(NC&2516))                                COS70360
ISN 0042            RS(L1)=DR(NP2,L1)/(2.*DATA(NC&2517))                                COS70370
ISN 0043            VL(N,L1)=1./(RU(L1)&RP(L1))                                         COS70380
ISN 0044            VL(NP1,L1)=1./(RP(L1)&RS(L1))                                       COS70390
ISN 0045            VLR(L1)=DATA(NC&2518)                                               COS70400
ISN 0046            RR=1./VLR(L1)
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ISN 0047          VL(NP2,L1)=1./(RS(L1)&RR)                          COS70430
ISN 0048       71 DX(L1)=DATA(NC&2519)/DATA(NC&2502)                 COS70440
ISN 0049          RETURN                                             COS70450
ISN 0050          END
```

```
            C      CANC
ISN 0002           SUBROUTINE CANCIL(FVI,ICAN,NS,NP3,TEM,DT,                        OS20010
                  1P)                                                               OS20020
            C      CANCIL
ISN 0003           COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                  1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                  2,21,10)
ISN 0004           COMMON/CDAT/DATA(3500)
ISN 0005           COMMON/CAN/AI(15),BI(15),CI(15),DI(15),A(15),B(15),C(15),TN(15),PZ
                  1(15),W(15,21),TPP(21)
ISN 0006           NVI=FVI&1.0001                                                   COS70010
ISN 0007           P=P                                                              COS70020
ISN 0008           IC=ICAN                                                          COS70030
ISN 0009           NC=30*(IC-1)&1                                                   COS70040
ISN 0010           N=MZ(IC)                                                         COS70050
ISN 0011           NSV=MSV(IC)                                                      COS70060
ISN 0012           NS=NSV&1                                                         COS70070
ISN 0013           NP1=N&1                                                          COS70080
ISN 0014           NP2=N&2                                                          COS70090
ISN 0015           NP3=N&3                                                          COS70100
ISN 0016           T=TEM                                                            COS70110
ISN 0017           DO 61 I=1,NS                                                     COS70120
ISN 0018        61 TPP(I)    =TP(NP3,I,IC)
ISN 0019           CALL VINIZ(1,IC,T,TPI,WS)                                        COS70140
ISN 0020           TP(NP3,1,IC)=TPI                                                 COS70150
ISN 0021           CALL POT(1,IC,N,NS,T,P)                                          COS70160
ISN 0022           F=3.14*DR(NP3,IC)*(DR(NP3,IC)&2.*R(NP2,IC))*RO(NP3,IC)*WS        COS70170
ISN 0023           CI(1)=VL(1,IC)*R(1,IC)                                           COS70180
ISN 0024           DI(1)=FVI*RO(1,IC)*SC(1,IC)*R(1,IC)*R(1,IC)/(2.*DT)              COS70190
ISN 0025           BI(1)=-(CI(1)&DI(1))                                             COS70200
ISN 0026           DO 11 I=2,NP1                                                    COS70210
ISN 0027           AI(I)=VL(I-1,IC)*R(I-1,IC)                                       COS70220
ISN 0028           CI(I)=VL(I,IC)*R(I,IC)                                           COS70230
ISN 0029           DI(I)=FVI*RO(I,IC)*SC(I,IC)*DR(I,IC)*(R(I-1,IC)&0.5*DR(I,IC))/DT COS70240
ISN 0030        11 BI(I)=-(AI(I)&CI(I)&DI(I))                                       COS70250
ISN 0031           AI(NP2)=VL(NP1,IC)*R(NP1,IC)                                     COS70260
ISN 0032           CI(NP2)=0.5*VL(NP2,IC)*R(NP2,IC)                                 COS70270
ISN 0033           DI(NP2)=FVI*RO(NP2,IC)*SC(NP2,IC)*DR(NP2,IC)*(R(NP1,IC)&0.5*DR(NP2 COS70280
                  1,IC))/DT                                                         COS70290
ISN 0034           BI(NP2)=-(AI(NP2)&2.*CI(NP2)&DI(NP2))                            COS70300
ISN 0035           AI(NP3)=VL(NP2,IC)*R(NP2,IC)                                     COS70310
ISN 0036           DI(NP3)=FVI*RO(NP3,IC)*SC(NP3,IC)*DR(NP3,IC)*(R(NP2,IC)&0.5*DR(NP3 COS70320
                  1,IC))/DT                                                         COS70330
ISN 0037           G=SC(NP3,IC)*F/(3.14*DX(IC))                                     COS70340
ISN 0038           E=0.5*(AI(NP3)-G&DI(NP3))                                        COS70350
ISN 0039           BI(NP3)=-0.5*(AI(NP3)&G&DI(NP3))                                 COS70360
ISN 0040           DO 17 I=2,NS                                                     COS70370
ISN 0041           I=I                                                              COS70380
ISN 0042           IF (DATA(NC&2515)*DATA(NC&2517)-1.0E-06)1,1,4                    COS70390
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ISN 0043            1 IF (FVI)100,100,1010                                      COS70400
ISN 0044          100 PZ(1)=W(1,I)                                              COS70410
ISN 0045              DO 1000 K=2,N                                             COS70420
ISN 0046         1000 PZ(K)=PZ(K-1)&W(K,I)                                      COS70430
ISN 0047              TP(NP3,I,IC)=TP(NP3,I-1,IC)&2.0*PZ(N)/G                   COS70440
ISN 0048              IF (DATA(NC&2517)-1.0E-07)1001,1001,1002                  COS70450
ISN 0049         1001 CALL HTC(TP(NP3,I,IC),TPG,WS,VLT,IC)                      COS70460
ISN 0050              RR=1.0/VLT
ISN 0051              IF (DATA(NC&2515)-1.0E-07)1002,1002,105                   COS70480
ISN 0052         1002 TPG=0.5*(TP(NP3,I,IC)&TP(NP3,I-1,IC))&PZ(N)*(RS(IC)&RR    )/R(NP2, COS70490
                     1)                                                         COS70500
ISN 0053              KK=N-1                                                    COS70510
ISN 0054              TP(N,I,IC)=0.0                                            COS70520
ISN 0055              DO 1003 K=1,KK                                            COS70530
ISN 0056              L=N-K                                                     COS70540
ISN 0057         1003 TP(L,I,IC)=PZ(L)/CI(L)&TP(L&1,I,IC)                       COS70550
ISN 0058              SUM=TP(1,I,IC)*R(1,IC)*R(1,IC)                            COS70560
ISN 0059              DO 1004 J=2,KK                                            COS70570
ISN 0060         1004 SUM=SUM&TP(J,I,IC)*(2.0*R(J-1,IC)&DR(J,IC))*DR(J,IC)      COS70580
ISN 0061              TMA=SUM/(R(N,IC)*R(N,IC))                                 COS70590
ISN 0062              ALF=PZ(N)*(RS(IC)/R(NP1,IC)&RU(IC)/R(N,IC))               COS70600
ISN 0063              BET=PZ(N)*0.5*(1.0/R(NP1,IC)&1.0/R(N,IC))                 COS70610
ISN 0064              COST=DATA(2500)                                           COS70620
ISN 0065              CALL GAPIZ(TMA,TPG,ALF,BET,RGAP,COST,IC)                  COS70630
ISN 0066              GO TO 102                                                 COS70640
ISN 0067         1010 IF (DATA(NC&2515)-1.0E-C7)101,101,3                       COS70650
ISN 0068          101 CALL GAP(TMU(IC,I),TP(N,I,IC),TP(NP2,I,IC),RGAP,COST,IC)  COS70660
ISN 0069          102 CONTINUE                                                  COS70670
ISN 0070              VL(N,IC)=1./(RU(IC)&0.5*RGAP)                             COS70680
ISN 0071              VL(NP1,IC)=1./(0.5*RGAP&RS(IC))                           COS70690
ISN 0072              DO 5 K=N,NP1                                              COS70700
ISN 0073              AI(K)=VL(K-1,IC)*R(K-1,IC)                                COS70710
ISN 0074              CI(K)=VL(K,IC)*R(K,IC)                                    COS70720
ISN 0075            5 BI(K)=-(AI(K)&CI(K)&DI(K))                                COS70730
ISN 0076              AI(NP2)=VL(NP1,IC)*R(NP1,IC)                              COS70740
ISN 0077              BI(NP2)=-(AI(NP2)&2.*CI(NP2)&DI(NP2))                     COS70750
ISN 0078            2 IF (DATA(NC&2517)-1.0E-07)3,3,4                           COS70760
ISN 0079            3 CALL HTC(TP(NP3,I,IC),TP(NP2,I,IC),WS,VLT,IC)            COS70770
ISN 0080          105 CONTINUE                                                  COS70780
ISN 0081              RR=1.0/VLT
ISN 0082              VL(NP2,IC)=1.0/(RS(IC)&RR)
ISN 0083              CI(NP2)=0.5*VL(NP2,IC)*R(NP2,IC)                          COS70810
ISN 0084              BI(NP2)=-(AI(NP2)&2.*CI(NP2)&DI(NP2))                     COS70820
ISN 0085              AI(NP3)=VL(NP2,IC)*R(NP2,IC)                              COS70830
ISN 0086              E=0.5*(AI(NP3)-G&DI(NP3))                                 COS70840
ISN 0087              BI(NP3)=-0.5*(AI(NP3)&G&DI(NP3))                          COS70850
ISN 0088            4 B(1)=BI(1)                                                COS70860
ISN 0089              C(1)=CI(1)                                                COS70870
ISN 0090              DO 18 K=2,NP2                                             COS70880
ISN 0091              A(K)=AI(K)                                                COS70890
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ISN 0092          B(K)=BI(K)                                                      COS70900
ISN 0093      18  C(K)=CI(K)                                                      COS70910
ISN 0094          DO 72 K=1,N                                                     COS70920
ISN 0095      72  TN(K)=-DI(K)*TP(K,I,IC)-W(K,I)                                  COS70930
ISN 0096          A(NP3)=AI(NP3)                                                  COS70940
ISN 0097          B(NP3)=BI(NP3)                                                  COS70950
ISN 0098          TN(NP1)=-DI(NP1)*TP(NP1,I,IC)                                   COS70960
ISN 0099          TN(NP2)=-DI(NP2)*TP(NP2,I,IC)-CI(NP2)*TP(NP3,I-1,IC)            COS70970
ISN 0100          TN(NP3)=E*TP(NP3,I-1,IC)-0.5*DI(NP3)*(TPP(I-1)&  TPP(I))
          C   RISOLUZIONE SISTEMA
ISN 0101          DO 19 K=2,NP3                                                   COS70990
ISN 0102          B(K)=B(K)-A(K)*C(K-1)/B(K-1)                                    COS71000
ISN 0103      19  TN(K)=TN(K)-A(K)*TN(K-1)/B(K-1)                                 COS71010
ISN 0104          TP(NP3,I,IC)=TN(NP3)/B(NP3)                                     COS71020
ISN 0105          DO 20 K=1,NP2                                                   COS71030
ISN 0106          K1=NP3-K                                                        COS71040
ISN 0107      20  TP(K1,I,IC)=TN(K1)/B(K1)-TP(K1&1,I,IC)*C(K1)/B(K1)             COS71050
ISN 0108      17  CONTINUE                                                        COS71060
ISN 0109          CALL INTEGR(1,IC,N,NS,NP1,NP2,NP3)                             COS71070
ISN 0110          IF (FVI)31,31,80                                               COS71080
ISN 0111      31  WRITE (6,21)IC,T                                               COS71090
ISN 0112      33  DO 36 I=1,NS                                                    COS71100
ISN 0113      36  WRITE (6,23)(TP(J,I,IC),J=1,NP3)                               COS71110
ISN 0114          WRITE (6,90)(TMED(IC,I),I=1,4)                                 COS71120
ISN 0115      21  FORMAT (1H0////9H CANALE NI3,5X,3HT =F8.3//)                   COS71130
ISN 0116      23  FORMAT (1H0,10F10.3)                                           COS71140
ISN 0117      90  FORMAT (1H0///21H  TEMPERATURE MEDIE  //5X,4HTU =F10.3,5X,5HTG1 =  COS71150
                 1F10.3,5X,5HTG2 =F10.3,5X,4HTR =F10.3)                          COS71160
ISN 0118      80  RETURN                                                         COS71170
ISN 0119          END                                                            COS71180
                                                                                 COS71190
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          C       CANS
ISN 0002          SUBROUTINE CANSL(FVI,ICAN,NS,NP3,TEM,DT,                    OS20010
                 1P)                                                          OS20020
ISN 0003          COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                 1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                 2,21,10)
ISN 0004          COMMON/CDAT/DATA(3500)
ISN 0005          COMMON/CAN/AI(15),BI(15),CI(15),DI(15),A(15),B(15),C(15),TN(15),PZ
                 1(15),W(15,21),TPP(21)
ISN 0006          NVI=FVI&1.0001                                             COS70010
ISN 0007          P=P                                                         COS70020
ISN 0008          L=0                                                         COS70030
ISN 0009          IC=ICAN                                                     COS70040
ISN 0010          NC=30*(IC-1)&1                                             COS70050
ISN 0011          N=MZ(IC)                                                    COS70060
ISN 0012          NSV=MSV(IC)                                                 COS70070
ISN 0013          NS=NSV&1                                                    COS70080
ISN 0014          NP1=N&1                                                     COS70090
ISN 0015          NP2=N&2                                                     COS70100
ISN 0016          NP3=N&3                                                     COS70110
ISN 0017          T=TEM                                                       COS70120
ISN 0018          DO 61 I=1,NS                                                COS70130
ISN 0019       61 TPP(I)   =TP(NP3,I,IC)
ISN 0020          CALL VINIZ(2,IC,T,TPI,WS)
ISN 0021          TP(NP3,1,IC)=TPI
ISN 0022          CALL POT(2,IC,N,NS,T,P)                                     COS70170
ISN 0023          CI(1)=VL(1,IC)                                              COS70180
ISN 0024          CI(1)=FVI*RO(1,IC)*SC(1,IC)*DR(1,IC)/DT                     COS70190
ISN 0025          BI(1)=-(CI(1)&DI(1))                                        COS70200
ISN 0026          DO 11 I=2,NP1                                               COS70210
ISN 0027          AI(I)=VL(I-1,IC)                                            COS70220
ISN 0028          CI(I)=VL(I,IC)                                              COS70230
ISN 0029          DI(I)=FVI*RO(I,IC)*SC(I,IC)*DR(I,IC)/DT                     COS70240
ISN 0030       11 BI(I)=-(AI(I)&CI(I)&DI(I))                                  COS70250
ISN 0031          AI(NP2)=VL(NP1,IC)                                          COS70260
ISN 0032          CI(NP2)=0.5*VL(NP2,IC)                                      COS70270
ISN 0033          DI(NP2)=FVI*RO(NP2,IC)*SC(NP2,IC)*DR(NP2,IC)/DT            COS70280
ISN 0034          BI(NP2)=-(AI(NP2)&2.*CI(NP2)&DI(NP2))                       COS70290
ISN 0035          AI(NP3)=VL(NP2,IC)                                          COS70300
ISN 0036          DI(NP3)=FVI*RO(NP3,IC)*SC(NP3,IC)*DR(NP3,IC)/DT            COS70310
ISN 0037          G=2.*SC(NP3,IC)*RO(NP3,IC)*WS*DR(NP3,IC)/DX(IC)
ISN 0038          E=0.5*(AI(NP3)-G&DI(NP3))                                   COS70330
ISN 0039          BI(NP3)=-0.5*(AI(NP3)&G&DI(NP3))                            COS70340
ISN 0040          DO 17 I=2,NS                                                COS70350
ISN 0041          I=I                                                         COS70360
ISN 0042          IF (DATA(NC&2515)*DATA(NC&2517)-1.0E-06)1,1,4              COS70370
ISN 0043        1 IF (FVI)100,100,1010                                       COS70380
ISN 0044      100 PZ(1)=W(1,I)                                               COS70390
ISN 0045          DO 1000 K=2,N                                              COS70400
```

```
ISN 0046   1000 PZ(K)=PZ(K-1)&W(K,I)                                      COS70410
ISN 0047        TP(NP3,I,IC)=TP(NP3,I-1,IC)&2.0*PZ(N)/G                   COS70420
ISN 0048        IF (DATA(NC&2517)-1.0E-07)1001,1001,1002                 COS70430
ISN 0049   1001 CALL  HTC(TP(NP3,I,IC),TPG,WS,VLT,IC)
ISN 0050        RR=1.0/VLT
ISN 0051        IF (DATA(NC&2515)-1.0E-07)1002,1002,105                  COS70460
ISN 0052   1002 TPG=0.5*(TP(NP3,I,IC)&TP(NP3,I-1,IC))&PZ(N)*(RS(IC)&RR)  COS70470
ISN 0053        KK=N-1                                                    COS70480
ISN 0054        TP(N,I,IC)=0.0                                           COS70490
ISN 0055        DO 1003 K=1,KK                                           COS70500
ISN 0056        L=N-K                                                     COS70510
ISN 0057   1003 TP(L,I,IC)=PZ(L)/CI(L)&TP(L&1,I,IC)                      COS70520
ISN 0058        SUM=TP(1,I,IC)                                          COS70530
ISN 0059        DO 1004 J=2,KK                                          COS70540
ISN 0060   1004 SUM=SUM&TP(J,I,IC)                                       COS70550
ISN 0061        TMA=SUM/FLOAT(N)                                         COS70560
ISN 0062        ALF=PZ(N)*(RS(IC)&RU(IC))                               COS70570
ISN 0063        BET=PZ(N)                                               COS70580
ISN 0064        COST=DATA(2500)                                          COS70590
ISN 0065        CALL GAPIZ(TMA,TPG,ALF,BET,RGAP,COST,IC)               COS70600
ISN 0066        GO TO 102                                               COS70610
ISN 0067   1010 IF (DATA(NC&2515)-1.0E-07)101,101,3                     COS70620
ISN 0068    101 CALL GAP(TMU(IC,I),TP(N,I,IC),TP(NP2,I,IC),RGAP,COST,IC)COS70630
ISN 0069    102 CONTINUE                                                COS70640
ISN 0070        VL(N,IC)=1.0/(RU(IC)&0.5*RGAP)                          COS70650
ISN 0071        VL(NP1,IC)=1.0/(0.5*RGAP&RS(IC))                        COS70660
ISN 0072        DO 5 K=N,NP1                                            COS70670
ISN 0073        AI(K)=VL(K-1,IC)                                        COS70680
ISN 0074        CI(K)=VL(K,IC)                                          COS70690
ISN 0075      5 BI(K)=-(AI(K)&CI(K)&DI(K))                             COS70700
ISN 0076        AI(NP2)=VL(NP1,IC)                                      COS70710
ISN 0077        BI(NP2)=-(AI(NP2)&2.0*CI(NP2)&DI(NP2))                 COS70720
ISN 0078      2 IF (DATA(NC&2517)-1.0E-07)3,3,4                        COS70730
ISN 0079      3 CALL HTC(TP(NP3,I,IC),TP(NP2,I,IC),WS,VLT,IC)
ISN 0080    105 CONTINUE                                               COS70750
ISN 0081        RR=1.0/VLT
ISN 0082        VL(NP2,IC)=1.0/(RS(IC)&RR)
ISN 0083        CI(NP2)=0.5*VL(NP2,IC)                                 COS70780
ISN 0084        BI(NP2)=-(AI(NP2)&2.0*CI(NP2)&DI(NP2))                COS70790
ISN 0085        AI(NP3)=VL(NP2,IC)                                     COS70800
ISN 0086        E=0.5*(AI(NP3)-G&DI(NP3))                             COS70810
ISN 0087        BI(NP3)=-0.5*(AI(NP3)&G&DI(NP3))                      COS70820
ISN 0088      4 B(1)=BI(1)                                             COS70830
ISN 0089        C(1)=CI(1)                                             COS70840
ISN 0090        DO 18 K=2,NP2                                          COS70850
ISN 0091        A(K)=AI(K)                                             COS70860
ISN 0092        B(K)=BI(K)                                             COS70870
ISN 0093     18 C(K)=CI(K)                                             COS70880
ISN 0094        DO 72 K=1,N                                            COS70890
ISN 0095     72 TN(K)=-DI(K)*TP(K,I,IC)-W(K,I)                         COS70900
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ISN 0096          A(NP3)=AI(NP3)                                              COS70910
ISN 0097          B(NP3)=BI(NP3)                                              COS70920
ISN 0098          TN(NP1)=-DI(NP1)*TP(NP1,I,IC)                               COS70930
ISN 0099          TN(NP2)=-DI(NP2)*TP(NP2,I,IC)-CI(NP2)*TP(NP3,I-1,IC)        COS70940
ISN 0100          TN(NP3)=E*TP(NP3,I-1,IC)-0.5*DI(NP3)*(TPP(I-1)&   TPP(I))
      C    RISOLUZIONE SISTEMA                                               COS70960
ISN 0101          DO 19 K=2,NP3                                               COS70970
ISN 0102          B(K)=B(K)-A(K)*C(K-1)/B(K-1)                               COS70980
ISN 0103       19 TN(K)=TN(K)-A(K)*TN(K-1)/B(K-1)                            COS70990
ISN 0104          TP(NP3,I,IC)=TN(NP3)/B(NP3)                                COS71000
ISN 0105          DO 20 K=1,NP2                                              COS71010
ISN 0106          K1=NP3-K                                                   COS71020
ISN 0107       20 TP(K1,I,IC)=TN(K1)/B(K1)-TP(K1&1,I,IC)*C(K1)/B(K1)         COS71030
ISN 0108       17 CONTINUE                                                   COS71040
ISN 0109          CALL INTEGR(2,IC,N,NS,NP1,NP2,NP3)                         COS71050
ISN 0110          IF (FVI)31,31,80                                           COS71060
ISN 0111       31 WRITE (6,21)IC,T                                          COS71070
ISN 0112       33 DO 36 I=1,NS                                              COS71080
ISN 0113       36 WRITE (6,23)(TP(J,I,IC),J=1,NP3)                          COS71090
ISN 0114          WRITE (6,90)(TMED(IC,I),I=1,4)                            COS71100
ISN 0115       21 FORMAT (1H0///9H CANALE N I3,5X,3HT =F8.3//)             COS71110
ISN 0116       23 FORMAT (1H0,10F10.3)                                      COS71120
ISN 0117       90 FORMAT (1H0///21H  TEMPERATURE MEDIE  //5X,4HTU =F10.3,5X,5HTG1 =  COS71130
                 1F10.3,5X,5HTG2 =F10.3,5X,4HTR =F10.3)                     COS71140
ISN 0118       80 RETURN                                                    COS71150
ISN 0119          END                                                       COS71160
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          C        VINI
ISN 0002           SUBROUTINE VINIZ(JJ,IC,T,TPI,WS)                                    OS20010
          C        VINIZ
ISN 0003           COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                  1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                  2,21,10)
ISN 0004           COMMON/CCAT/DATA(3500)
ISN 0005           IC=IC                                                               COS70010
ISN 0006           ICC=30*(IC-1)                                                       COS70020
ISN 0007           IF (DATA(ICC&2521)-0.0001)9,9,15                                    COS70030
ISN 0008        15 IF (T-1.0E-07)50,50,51                                             COS70040
ISN 0009        50 TPI=DATA(ICC&2521)
ISN 0010           GO TO 16                                                            COS70060
ISN 0011        51 TPI=DATA(ICC&2521)&DATA(ICC&2522)&DATA(ICC&2523)*T
ISN 0012           GO TO 16                                                            COS70080
ISN 0013         9 IAA=10*(IC-1)                                                       COS70090
ISN 0014           DO 1 I=1,10                                                         COS70100
ISN 0015           IPP=IAA&I                                                           COS70110
ISN 0016           TAV=DATA(IPP&2901)                                                  COS70120
ISN 0017           IF (T-TAV)2,3,1                                                     COS70130
ISN 0018         2 TRAV=DATA(IPP&2801)                                                 COS70140
ISN 0019           TRDI=DATA(IPP&2800)                                                 COS70150
ISN 0020           TDI=DATA(IPP&2900)                                                  COS70160
ISN 0021           TPI=TRDI&(T-TDI)*(TRAV-TRDI)/(TAV-TDI)
ISN 0022           GO TO 4                                                             COS70180
ISN 0023         3 TRAV=DATA(IPP&2801)                                                 COS70190
ISN 0024           TPI=TRAV
ISN 0025           GO TO 4                                                             COS70210
ISN 0026         1 CONTINUE                                                            COS70220
ISN 0027           TPI=TRAV
ISN 0028         4 CONTINUE                                                            COS70240
ISN 0029        16 IF (DATA(ICC&2524)-1.0E-06)11,11,18                                COS70250
ISN 0030        18 IF (T-1.0E-10)52,52,53                                             COS70260
ISN 0031        52 WS=DATA(ICC&2524)
ISN 0032           GO TO 12                                                            COS70280
ISN 0033        53 WS=DATA(ICC&2524)&DATA(ICC&2525)&DATA(ICC&2526)*T
ISN 0034           GO TO 12                                                            COS70300
ISN 0035        11 IAA=10*(IC-1)                                                       COS70310
ISN 0036           DO 5 I=1,10                                                         COS70320
ISN 0037           IPP=IAA&I                                                           COS70330
ISN 0038           TAV=DATA(IPP&3101)                                                  COS70340
ISN 0039           IF (T-TAV)6,7,5                                                     COS70350
ISN 0040         6 VAV=DATA(IPP&3001)                                                  COS70360
ISN 0041           VDI=DATA(IPP&3000)                                                  COS70370
ISN 0042           TDI=DATA(IPP&3100)                                                  COS70380
ISN 0043           WS=VDI&(T-TDI)*(VAV-VDI)/(TAV-TDI)
ISN 0044           GO TO 8                                                             COS70400
ISN 0045         7 VAV=DATA(IPP&3001)                                                  COS70410
ISN 0046           WS=VAV
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ISN 0047          GO TO 8              COS70430
ISN 0048        5 CONTINUE             COS70440
ISN 0049          WS=VAV
ISN 0050        8 CONTINUE             COS70460
ISN 0051       12 CONTINUE             COS70470
ISN 0052          RETURN               COS70480
ISN 0053          END                  COS70490
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```
              C       POT
ISN 0002              SUBROUTINE PCT(JJ,IC,N,NS,TO,POWER)                           OS20010
              C       POT
ISN 0003              DIMENSION FAS(16),PFAS(16)
ISN 0004              COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                     1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                     2,21,10)
ISN 0005              COMMON/CAN/AI(15),BI(15),CI(15),DI(15),A(15),B(15),C(15),TN(15),PZ
                     1(15),W(15,21),TPP(21)
ISN 0006              COMMON/CDAT/DATA(3500)
ISN 0007              GC TO (11,12),JJ                                              COS70010
ISN 0008           11 RUQ=3.1416*R(N,IC)**2*DX(IC)                                  COS70020
ISN 0009              NC=(IC-1)*20                                                  COS70030
ISN 0010              SUM=0.0                                                       COS70040
ISN 0011              DO 1 I=2,NS                                                   COS70050
ISN 0012              IFAS=I&NC                                                     COS70060
ISN 0013              FAS(I)=DATA(IFAS&1999)                                        COS70070
ISN 0014            1 SUM=SUM&FAS(I)                                                COS70080
ISN 0015              DO 15 I=2,NS                                                  COS70090
ISN 0016              PFAS(I)=POWER*FAS(I)/(SUM*RUQ)                                COS70100
ISN 0017           15 PFAS(I)=0.5*PFAS(I)                                          COS70110
ISN 0018              DO 2 I=2,NS                                                   COS70120
ISN 0019              W(1,I)=PFAS(I)*DR(1,IC)*DR(1,IC)                              COS70130
ISN 0020              IF (N-2)2,7,7                                                 COS70140
ISN 0021            7 DO 3 J=2,N                                                    COS70150
ISN 0022            3 W(J,I)=PFAS(I)*DR(J,IC)*(2.*R(J-1,IC)&DR(J,IC))              COS70160
ISN 0023            2 CONTINUE                                                      COS70170
ISN 0024              GO TO 100                                                     COS70180
ISN 0025           12 NCC=(IC-1)*30                                                 COS70190
ISN 0026              RUQ=DATA(NCC&2503)*DATA(NCC&2520)*DX(IC)                      COS70200
ISN 0027              NC=(IC-1)*20                                                  COS70210
ISN 0028              SUM=0.0                                                       COS70220
ISN 0029              DO 4 I=2,NS                                                   COS70230
ISN 0030              IFAS=I&NC                                                     COS70240
ISN 0031              FAS(I)=DATA(IFAS&1999)                                        COS70250
ISN 0032            4 SUM=SUM&FAS(I)                                                COS70260
ISN 0033              DO 6 I=2,NS                                                   COS70270
ISN 0034            6 PFAS(I)=POWER*FAS(I)/(SUM*RUQ)                                COS70280
ISN 0035              DO 5 I=2,NS                                                   COS70290
ISN 0036              DO 5 J=1,N                                                    COS70300
ISN 0037            5 W(J,I)=PFAS(I)*DR(J,IC)                                       COS70310
ISN 0038          100 RETURN                                                        COS70320
ISN 0039              END                                                          COS70330
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          C        INTG
ISN 0002           SUBROUTINE INTEGR(JJ,IC,N,NS,NP1,NP2,                        OS20010
                  1NP3)                                                         OS20020
ISN 0003           COMMON/COMI/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                  1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                  2,21,10)
ISN 0004           COMMON/CDAT/DATA(3500)
ISN 0005           JJ=JJ                                                        COS70010
ISN 0006           NSM1=NS-1                                                    COS70020
ISN 0007           FNSV=FLOAT(NSM1)                                            COS70030
ISN 0008           GO TO (10,20),JJ                                            COS70040
ISN 0009        10 TMUR=0                                                      COS70050
ISN 0010           DO 2 I=2,NS                                                 COS70060
ISN 0011           SUMTP=TP(1,I,IC)*R(1,IC)*R(1,IC)                           COS70070
ISN 0012           DO 1 J=2,N                                                  COS70080
ISN 0013         1 SUMTP=SUMTP&TP(J,I,IC)*(2.*R(J-1,IC)&DR(J,IC))*DR(J,IC)    COS70090
ISN 0014           TMU(IC,I)=SUMTP/(R(N,IC)*R(N,IC))                          COS70100
ISN 0015         2 TMUR=TMUR&TMU(IC,I)                                        COS70110
ISN 0016           TMED(IC,1)=TMUR/FNSV                                       COS70120
ISN 0017           GO TO 30                                                    COS70130
ISN 0018        20 TMUR=0                                                      COS70140
ISN 0019           DO 7 I=2,NS                                                 COS70150
ISN 0020           SUMTP=0                                                     COS70160
ISN 0021           DO 8 J=1,N                                                  COS70170
ISN 0022         8 SUMTP=SUMTP&TP(J,I,IC)*DR(J,IC)                            COS70180
ISN 0023           TMU(IC,I)=SUMTP/R(N,IC)                                    COS70190
ISN 0024         7 TMUR=TMUR&TMU(IC,I)                                        COS70200
ISN 0025           TMED(IC,1)=TMUR/FNSV                                       COS70210
ISN 0026        30 TM2=0.                                                      COS70220
ISN 0027           DO 3 I=2,NS                                                 COS70230
ISN 0028         3 TM2=TM2&TP(NP1,I,IC)                                       COS70240
ISN 0029           TMED(IC,2)=TM2/FNSV                                        COS70250
ISN 0030           TM3=0                                                       COS70260
ISN 0031           DO 4 I=2,NS                                                 COS70270
ISN 0032         4 TM3=TM3&TP(NP2,I,IC)                                       COS70280
ISN 0033           TMED(IC,3)=TM3/FNSV                                        COS70290
ISN 0034           TM4=0.5*(TP(NP3,1,IC)&TP(NP3,NS,IC))                       COS70300
ISN 0035           DO 5 I=2,NSM1                                               COS70310
ISN 0036         5 TM4=TM4&TP(NP3,I,IC)                                       COS70320
ISN 0037           TMED(IC,4)=TM4/FNSV                                        COS70330
ISN 0038           RETURN                                                      COS70340
ISN 0039           END                                                        COS70350
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

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              C       AZER
ISN 0002              SUBROUTINE AZER
              C       AZER
ISN 0003              COMMON/COMT/A(4210)
ISN 0004              COMMON/COMN/B(3769)
ISN 0005              COMMON/CAN/C(471)
ISN 0006              DO 1 I=1,4210
ISN 0007            1 A(I)=0.0
ISN 0008              DO 2 I=1,3769
ISN 0009            2 B(I)=0.0
ISN 0010              DO 3 I=1,471
ISN 0011            3 C(I)=0.0
ISN 0012              RETURN
ISN 0013              END
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
          C        GAPI
ISN 0002           SUBROUTINE GAPIZ(TMA,TPG,ALF,BET,RGAP,CCST,                      OS20010
                  1IC)                                                              OS20020
ISN 0003           COMMON/CDMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                  1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                  2,21,10)
ISN 0004           COMMON/CDAT/DATA(3500)
ISN 0005           AFUN(RGAP)=9.7*COST*(AA&BB*RGAP)*(ALF&BET*RGAP)/((ALF&BET*RGAP&TAG COST0010
                  1)**1.65-TT)-RGAP                                                 COST0020
ISN 0006           BFUN(RGAP)=9.7*COST*5.0*(ALF&BET*RGAP)/((ALF&BET*RGAP&TAG)**1.65- COST0030
                  1TT)-RGAP                                                         COST0040
ISN 0007           IC=IC                                                            COST0050
ISN 0008           TAG=TPG&273.0                                                    COST0060
ISN 0009           AA=-58.C&0.165*TAG-0.148*(TMA&ALF)                               COST0070
ISN 0010           BB=-0.148*BET                                                    COST0080
ISN 0011           TT=TAG**1.65                                                     COST0090
ISN 0012           IF (AA-5.0)8,8,18                                               COST0100
ISN 0013        18 RGAP=(5.0-AA)/BB                                                 COST0110
ISN 0014           X=AFUN(RGAP)                                                     COST0120
ISN 0015           IF (X)19,4,8                                                    COST0130
ISN 0016        19 XV=X                                                            COST0140
ISN 0017           RV=0.0                                                           COST0150
ISN 0018         7 RV1=RGAP                                                         COST0160
ISN 0019           RGAP=0.5*(RGAP&RV)                                              COST0170
ISN 0020           X=AFUN(RGAP)                                                     COST0180
ISN 0021           IF (ABS(X/RGAP)-0.001)4,3,3                                     COST0190
ISN 0022         3 SIGN=X*XV                                                        COST0200
ISN 0023           XV=X                                                             COST0210
ISN 0024           IF (SIGN)5,5,7                                                  COST0220
ISN 0025         5 RV=RV1                                                           COST0230
ISN 0026           GO TO 7                                                          COST0240
ISN 0027         4 GIO=AA&BB*RGAP                                                   COST0250
ISN 0028           GO TO 9                                                          COST0260
ISN 0029         8 GIO=5.0                                                          COST0270
ISN 0030           RV=0.0                                                           COST0280
ISN 0031           XV=-1.0                                                          COST0290
ISN 0032           RGAP=0.01                                                        COST0300
ISN 0033       111 X=BFUN(RGAP)                                                     COST0310
ISN 0034           IF (X)12,9,11                                                   COST0320
ISN 0035        11 RV=RGAP                                                          COST0330
ISN 0036           RGAP=2.0*RGAP                                                   COST0340
ISN 0037           GO TO 111                                                        COST0350
ISN 0038        12 RV1=RGAP                                                         COST0360
ISN 0039           RGAP=0.5*(RGAP&RV)                                              COST0370
ISN 0040           X=BFUN(RGAP)                                                     COST0380
ISN 0041           IF (ABS(X/RGAP)-0.001)9,13,13                                   COST0390
ISN 0042        13 SIGN=X*XV                                                        COST0400
ISN 0043           XV=X                                                             COST0410
ISN 0044           IF (SIGN)15,9,12                                                COST0420
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ISN 0045      15 RV=RV1                                              COS70430
ISN 0046         GO TO 12                                            COS70440
ISN 0047       9 WRITE (6,10)GIO,RGAP                                COS70450
ISN 0048      10 FORMAT (1H0/,5X,6H GIO =E12.5,5X,7H RGAP =E12.5)    COS70460
ISN 0049         RETURN                                              COS70470
ISN 0050         END                                                 COS70480
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```
              C       GAP
ISN 0002              SUBROUTINE GAP(TPUR,TPS,TPG,RGAP,COST,IC)                          OS20010
ISN 0003              COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                     1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                     2,21,10)
ISN 0004              COMMON/COAT/DATA(3500)
ISN 0005              IC=IC                                                              COS70010
ISN 0006              GIO=-58.0&0.313*(TPG&273.0)-0.148*(TPUR&273.0)                     COS70020
ISN 0007              IF (GIO-5.0)1,2,2                                                  COS70030
ISN 0008            1 GIO=5.0                                                            COS70040
ISN 0009            2 RGAP=9.7*GIO*(TPS-TPG)/((TPS&273.0)**1.65-(TPG&273.0)**1.65)*COST  COS70050
ISN 0010              RETURN                                                             COS70060
ISN 0011              END                                                               COS70070
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
          C       HTC
ISN 0002          SUBROUTINE HTC(TPCO,TPG,WS,VLT,IC)                              OS20010
ISN 0003          COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                 1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                 2,21,10)
ISN 0004          COMMON/CDAT/DATA(3500)
ISN 0005          TPG=TPG                                                          COS70010
ISN 0006          NC=3200&20*(IC-1)                                                COS70020
ISN 0007          DIAH=DATA(NC&17)                                                 COS70030
ISN 0008          A1=DATA(NC&1)                                                    COS70040
ISN 0009          A2=DATA(NC&2)                                                    COS70050
ISN 0010          A3=DATA(NC&3)                                                    COS70060
ISN 0011          A4=DATA(NC&4)                                                    COS70070
ISN 0012          A5=DATA(NC&5)                                                    COS70080
ISN 0013          A6=DATA(NC&6)                                                    COS70090
ISN 0014          A7=DATA(NC&7)                                                    COS70100
ISN 0015          A8=DATA(NC&8)                                                    COS70110
ISN 0016          A9=DATA(NC&9)                                                    COS70120
ISN 0017          A10=DATA(NC&10)                                                  COS70130
ISN 0018          A11=DATA(NC&11)                                                  COS70140
ISN 0019          A12=DATA(NC&12)                                                  COS70150
ISN 0020          A18=DATA(NC&18)                                                  COS70160
ISN 0021          A19=DATA(NC&19)                                                  COS70170
ISN 0022          A20=DATA(NC&20)                                                  COS70180
ISN 0023        2 TINV1=1.0/TPCO                                                   COS70190
ISN 0024          TINV2=TINV1*TINV1                                                COS70200
ISN 0025          TINV3=TINV1*TINV2                                                COS70210
ISN 0026          ROCO=A1&A2*TINV1&A3*TINV2&A4*TINV3                               COS70220
ISN 0027          CSCO=A5&A6*TPCO                                                  COS70230
ISN 0028          VISCO=A7&A8*TINV1&A9*TINV2&A10*TINV3                             COS70240
ISN 0029          CONCO=A11&A12*TPCO                                               COS70250
ISN 0030          PRANDT=VISCO*CSCO/CONCO                                          COS70260
ISN 0031          REYN=ROCO*DIAH*WS/VISCO
ISN 0032          VLT=A18*CONCO*REYN**A19*PRANDT**A20/DIAH                         COS70280
ISN 0033          RETURN                                                          COS70290
ISN 0034          END                                                            COS70300
```

```
              C       TEST
ISN 0002              SUBROUTINE TEST                                                           OS20010
ISN 0003              REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004              COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005              COMMON/COMN/KBA,KTE,KBAR,KS,NREG,IDST,ITCR,IT,LF,L1,IMAX,KBI,NRIT,
                     1IM1,NK,     SI,REP,SPCR,SBETA,PER,PINT,BU,VOLT,                    SPRG,DAP
                     2F,DELT,OLD,DLM,
                     3D1(10),D2(10),SF(10),SR(10),SA(10),SPR(10),SFI(10),SCR(10),W(10),V
                     4(10),SP(10),P(10),BETA(10),DL(10),DLDT(10),DETA(10),VIM(10),I1(10)
                     5,I2(10),KV(10),FLM1(10),FLM2(10),SAV(10),FLIM2(10),PI(10),COU(10),
                     6COR(10),TMUI(10),TMC1I(10),TMC2I(10),TCI(10),ICAN(10),SPRI(10),VR(
                     710),
                     8X(100),                 VOL1(100),VOL2(100),VOL(100),BE(100),BE1(10
                     90),BE2(100),AL1(100),AL2(100),AL22(100),AB2(100),BL1(100),BL2(100)
                     A,BI1(100),BI2(100),EP1(100),EP2(100),TO,             DER1(100),D
                     BER2(100),DEM1(100),DEM2(100),SORM(100),SFI(100),SFI1(100),C(10,100
                     C)
ISN 0006              COMMON/COMT/MZ(10),MSV(10),RU(10),DX(10),VLR(10),RS(10),VL(15,10),
                     1SC(15,10),RO(15,10),DR(15,10),R(15,10),TMED(4,10),TMU(10,21),TP(15
                     2,21,10)
ISN 0007              COMMON/CDAT/DATA(3500)
ISN 0008              KTE=0                                                                     COS70020
ISN 0009              RETURN                                                                    COS70030
ISN 0010              END                                                                       COS70040
```

COSTANZA   CILINDRICO

TEST COSTANZA CYLINDRICAL

1	0.100000E-02	2	0.100000E-02	3	0.100000E 01	4	0.210000E 02	5	0.200000E 01	6	0.0
7	0.0	8	0.100000E 02	9	0.100000E 01	10	0.100000E 01	11	0.100000E 01	12	0.100000E 02
13	0.500000E 01										
21	0.300000E 06										
61	0.100000E 01	62	0.110000E 02	63	0.210000E 02						
81	0.100000E 01	82	0.100000E-01	83	0.900000E 00	84	0.100000E-03	85	0.100000E 08	86	0.0
87	0.100000E 01	88	0.100000E-01	89	0.300000E-02	90	0.150000E-01	91	0.250000E 06	92	0.100000E 01
93	0.100000E 01	94	0.100000E-01	95	0.900000E 00	96	0.100000E-03	97	0.100000E 08	98	0.0
99	0.100000E 01	100	0.100000E-01	101	0.0	102	0.150000E-01	103	0.250000E 06	104	0.0
1602	0.200000E 01										
1611	0.100000E-03	1612	0.100000E-03	1613	0.100000E 03						
301	0.0	302	0.100000E-01	303	0.110000E-01						
331	0.0	332	0.0	333	0.100000E-03						
201	-0.500000E 01	202	0.500000E 01	203	0.200000E 02	204	0.300000E 02	205	0.400000E 02	206	0.500000E 02
207	0.600000E 02	208	0.700000E 02	209	0.800000E 02	210	0.900000E 02	211	0.100000E 03	212	0.110000E 03
213	0.120000E 03	214	0.130000E 03	215	0.140000E 03	216	0.150000E 03	217	0.160000E 03	218	0.170000E 03
219	0.180000E 03	220	0.190000E 03	221	0.200000E 03						
2001	0.100000E 01	2002	0.100000E 01	2003	0.100000E 01	2004	0.100000E 01	2005	0.100000E 01	2006	0.100000E 01
2007	0.100000E 01	2008	0.100000E 01	2009	0.100000E 01	2010	0.100000E 01				
2501	0.400000E 01	2502	0.100000E 02	2503	0.160000E 01	2504	0.100000E-01	2505	0.750000E-01	2506	0.240000E 00
2507	0.130000E 02	2508	0.100000E-02	2509	0.270000E 01	2510	0.100000E 01	2511	0.150000E 00	2512	0.500000E 01
2513	0.100000E 01	2514	0.100000E 01	2515	0.200000E 00	2516	0.200000E-01	2517	0.200000E 01	2518	0.166000E 01
2519	0.100000E 03	2520	0.0	2521	0.200000E 03	2522	0.0	2523	0.0	2524	0.100000E 04
2525	0.0	2526	0.0	2527	0.0	2528	0.0	2529	0.0	2530	0.100000E 01
1851	0.100000E 03	1852	0.100000E 02	1853	0.300000E 01	1854	0.500000E 02	1855	0.200000E 01	1856	0.0

RICERCA CRITICITA

REGIONI AVVELENATE   0   2

SPRG =   0.10000E-03   DAPF =   0.10000E-03   LF =   100   ITCR =   1

ITERAZIONI	PM2	REP	VELENO
38	0.10288D 02	-0.38623E-04	0.42622E-02

TO =   0.0   IT =   0   PER =-0.25972E 05   PINT = 0.0

	R	P1	P2
1	-0.50000E 01	0.54028D 01	0.36638D 01
2	0.50000E 01	0.54028D 01	0.36638D 01
3	0.20000E 02	0.52651D 01	0.35704D 01
4	0.30000E 02	0.50850D 01	0.34483D 01
5	0.40000E 02	0.48379D 01	0.32807D 01
6	0.50000E 02	0.45287D 01	0.30710D 01
7	0.60000E 02	0.41640D 01	0.28235D 01
8	0.70000E 02	0.37510D 01	0.25430D 01
9	0.80000E 02	0.32989D 01	0.22345D 01
10	0.90000E 02	0.28194D 01	0.19017D 01
11	0.10000E 03	0.23321D 01	0.15423D 01
12	0.11000E 03	0.18868D 01	0.12227D 01

13	0.12000E 03	0.15126D 01	0.97450D 00
14	0.13000E 03	0.12027D 01	0.77355D 00
15	0.14000E 03	0.94502D 00	0.60751D 00
16	0.15000E 03	0.72856D 00	0.46829D 00
17	0.16000E 03	0.54430D 00	0.34984D 00
18	0.17000E 03	0.38488D 00	0.24737D 00
19	0.18000E 03	0.24426D 00	0.15699D 00
20	0.19000E 03	0.11739D 00	0.75451D-01
21	0.20000E 03	0.0	0.0
	VALORI MEDI	0.15036D 01	0.10000D 01

TO = 0.05000   PM1 = 0.34349D 01   PM2 = 0.22841D 01   PER = 0.47762E-01

VELENI BARRE
-0.1000E-03   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
       FLM1
  0.8721E 01 0.1673E 01   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
       FLM2
  0.5904E 01 0.1078E 01   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

TO = 0.05000   IT =   50   PER = 0.47762E-01   PINT = 0.72552E-01

	R	P1	P2
1	0.50000E 01	0.12631D 02	0.85722D 01
2	0.50000E 01	0.12631D 02	0.85722D 01
3	0.20000E 02	0.12301D 02	0.83486D 01
4	0.30000E 02	0.11871D 02	0.80564D 01
5	0.40000E 02	0.11280D 02	0.76556D 01
6	0.50000E 02	0.10542D 02	0.71546D 01
7	0.60000E 02	0.96717D 01	0.65635D 01
8	0.70000E 02	0.86876D 01	0.58944D 01
9	0.80000E 02	0.76115D 01	0.51593D 01
10	0.90000E 02	0.64719D 01	0.43674D 01
11	0.10000E 03	0.53170D 01	0.35126D 01
12	0.11000E 03	0.42684D 01	0.27586D 01
13	0.12000E 03	0.33957D 01	0.21807D 01
14	0.13000E 03	0.26806D 01	0.17183D 01
15	0.14000E 03	0.20925D 01	0.13406D 01
16	0.15000E 03	0.16040D 01	0.10275D 01
17	0.16000E 03	0.11925D 01	0.76385D 00
18	0.17000E 03	0.83596D 00	0.53802D 00
19	0.18000E 03	0.53156D 00	0.34048D 00
20	0.19000E 03	0.25503D 00	0.16336D 00
21	0.20000E 03	0.0	0.0

VALORI MEDI   0.34349D 01   0.22841D 01

TEMPERATURE MEDIE   TO =   0.0500

M	TU	TG1	TG2	TR
1	1538.69	780.56	630.58	298.67

CANALE N 1   TIPO 1   TO =   0.050

1	0.0	0.0	0.0	0.0	0.0	0.0	200.000
2	2007.998	1858.811	1560.530	1115.241	691.495	541.524	219.626
3	2027.793	1878.605	1580.326	1135.037	711.279	561.304	239.318
4	2047.589	1898.400	1600.122	1154.833	731.068	581.091	259.057
5	2067.384	1918.194	1619.916	1174.629	750.862	600.884	278.829
6	2087.180	1937.991	1639.712	1194.425	770.659	620.680	298.619
7	2106.975	1957.786	1659.508	1214.221	790.453	640.474	318.415
8	2126.770	1977.582	1679.304	1234.018	810.249	660.270	338.212
9	2146.565	1997.377	1699.099	1253.814	830.046	680.067	358.006
10	2166.360	2017.172	1718.896	1273.611	849.839	699.859	377.801
11	2186.156	2036.968	1738.690	1293.406	869.636	719.657	397.596

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
          C        COSTAX
ISN 0002           REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0003           COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0004           COMMON/CDATA/DATA(3500)
ISN 0005           COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                  1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                  2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0006           COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SF1(12),SA(1
                  12),SPR(12),C(10,100),               P1S(100),P2S(100),SOR(12),SOR
                  2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                  3VOLT,AL2(100),AB2(100),               OLD,DER1(100),DER2(100),C
                  4OC(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
                  5L2(100),DLM,DEM1(100),DEM2(100)               ,EP1(100),BI1(100),BI2(
                  6100),               INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                  70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
                  8               AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
                  9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                  A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                  BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                  C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                  D1(100),SFI1(100),               COC1(10,100)
ISN 0007           DIMENSION ALFA(16)
ISN 0008           DO5000 J=1,3500
ISN 0009      5000 DATA(J)=0.0
ISN 0010       110 READ (5,20) LAST,ALFA
ISN 0011        20 FORMAT(I6,16A4)
ISN 0012           CALL AZER
ISN 0013           PINT=0.0
ISN 0014           WRITE (6,23)
ISN 0015        23 FORMAT (1H1,35X,17HCOSTANZA  ASSIALE//)
ISN 0016           WRITE (6,22) ALFA
ISN 0017        22 FORMAT (1H0,30X,16A4//////)
ISN 0018       100 READ(5,101)K$,K1,K2,(DATA(I),I=K1,K2)
ISN 0019       101 FORMAT(2I6,I12,/(6E12.8))
ISN 0020           WRITE (6,102) (I,DATA(I),I=K1,K2)
ISN 0021       102 FORMAT (6(I5,E14.6))
ISN 0022           IF(K$.GE.0)GOTO100
ISN 0024           PINT=0.0
ISN 0025           TO=0.0
ISN 0026           IT=0
ISN 0027           DZ=DATA(2)
ISN 0028           DZ2=DZ/2.0
ISN 0029           IMAX=DATA(3)&0.1
ISN 0030           NREG=DATA(4)&0.1
ISN 0031           NRIT=DATA(5)&0.1
ISN 0032           IDST=DATA(6)&0.1
ISN 0033           ITCR=DATA(7)&0.1
ISN 0034           IDIR=DATA(8)&0.1
ISN 0035           SI=DATA(9)
```

```
ISN 0036          BU=DATA(10)
ISN 0037          DELT=DATA(11)
ISN 0038          POWER=DATA(13)
ISN 0039          KPC=DATA(14)&0.1
ISN 0040          KMA1=DATA(15)&0.1
ISN 0041          ICAN=DATA(16)&0.1
ISN 0042          WRITE (6,19) DELT,TO,IT,IMAX,NREG,NRIT,INTE,IDST,ITCR
ISN 0043       19 FORMAT (1H0,6HDELT =,E12.5,4X,4HTO =,F12.5,4X,4HIT =,I5,4X,6HIMAX
                 1=,I5,4X,6HNREG =,I5////7H NRIT =,I5,4X,6HINTE =,I5,4X,6HIDST =,I5,4
                 2X,6HITCR =,I5 ///)
ISN 0044          INTE=1
ISN 0045          INTER=1
ISN 0046          KMAP=0
ISN 0047          KCAN=0
ISN 0048          IF(NRIT.LE.0)GOTO103
ISN 0050          DO 104 I=1,NRIT
ISN 0051          BETA(I)=DATA(I&30)
ISN 0052          DL(I)=DATA(I&40)
ISN 0053      104 CETA(I)=0.5*BETA(I)/DL(I)
ISN 0054          WRITE (6,71)
ISN 0055       71 FORMAT (1H0//,8X,4HBETA,14X,2HDL,//)
ISN 0056          WRITE (6,72) (BETA(I),DL(I),I=1,NRIT)
ISN 0057       72 FORMAT (1H ,2E16.5)
ISN 0058      103 CONTINUE
ISN 0059          DO 105 I=1,NREG
ISN 0060          I1(I)=DATA(I&60)&0.0001
ISN 0061          I2(I)=DATA(I&61)&0.0001
ISN 0062      105 CONTINUE
ISN 0063          WRITE (6,21)
ISN 0064       21 FORMAT (1H0/////,22H     INDICI   INTERFACCE//)
ISN 0065          WRITE (6,4) (I1(I),I=1,NREG),I2(NREG)
ISN 0066        4 FORMAT (11I10,/////)
ISN 0067          IDF=80
ISN 0068          DO 107 M=1,NREG
ISN 0069          D1(M)=DATA(IDF&1)
ISN 0070          SR(M)=DATA(IDF&2)
ISN 0071          P(M)=DATA(IDF&3)
ISN 0072          SF1(M)=DATA(IDF&4)
ISN 0073          W(M)=DATA(IDF&5)
ISN 0074          SOR(M)=DATA(IDF&6)
ISN 0075          D2(M)=DATA(IDF&7)
ISN 0076          SA(M)=DATA(IDF&8)
ISN 0077          SPR(M)=DATA(IDF&9)
ISN 0078          P1S(M)=SPR(M)
ISN 0079          SF(M)=DATA(IDF&10)
ISN 0080          V(M)=DATA(IDF&11)
ISN 0081          IDF=IDF&12
ISN 0082      107 CONTINUE
ISN 0083          DO 78 M=1,NREG
ISN 0084          ID=I2(M)-1
```

```
ISN 0085              IS=I1(M)&1
ISN 0086              DO 79 I=IS,ID
ISN 0087           79 SORM(I)=SOR(M)*DZ
ISN 0088              SORM(ID&1)=(SOR(M)&SOR(M&1))*DZ2
ISN 0089           78 CONTINUE
ISN 0090              DO 24 M=1,NREG
ISN 0091              WRITE (6,1) M,D1(M),SR(M),P(M),SF1(M),W(M),SOR(M)
ISN 0092           24 WRITE (6,1) M,D2(M),SA(M),SPR(M),SF(M),V(M)
ISN 0093            1 FORMAT (I3,6E16.5)
ISN 0094              IF(ICAN.LE.0)GO TO 77
ISN 0096              ICI=300
ISN 0097              DO 76 M=1,NREG
ISN 0098              SPRCU(M)=DATA(ICI&1)
ISN 0099              SPRCO(M)=DATA(ICI&2)
ISN 0100              SPRMO(M)=DATA(ICI&3)
ISN 0101              PCU(M)=DATA(ICI&4)
ISN 0102              PCO(M)=DATA(ICI&5)
ISN 0103              PMO(M)=DATA(ICI&6)
ISN 0104              SFCU(M)=DATA(ICI&7)
ISN 0105              SFCO(M)=DATA(ICI&8)
ISN 0106              SFMO(M)=DATA(ICI&9)
ISN 0107              SF1CU(M)=DATA(ICI&10)
ISN 0108              SF1CO(M)=DATA(ICI&11)
ISN 0109              SF1MO(M)=DATA(ICI&12)
ISN 0110              D1CU(M)=DATA(ICI&13)
ISN 0111              D1CO(M)=DATA(ICI&14)
ISN 0112              D1MO(M)=DATA(ICI&15)
ISN 0113              D2CU(M)=DATA(ICI&16)
ISN 0114              D2CO(M)=DATA(ICI&17)
ISN 0115              D2MO(M)=DATA(ICI&18)
ISN 0116              WCU(M)=DATA(ICI&19)
ISN 0117              WCO(M)=DATA(ICI&20)
ISN 0118              WMO(M)=DATA(ICI&21)
ISN 0119              VCU(M)=DATA(ICI&22)
ISN 0120              VCO(M)=DATA(ICI&23)
ISN 0121              VMO(M)=DATA(ICI&24)
ISN 0122              SRCU(M)=DATA(ICI&25)
ISN 0123              SRCO(M)=DATA(ICI&26)
ISN 0124              SRMO(M)=DATA(ICI&27)
ISN 0125              ICI=ICI&30
ISN 0126           76 CONTINUE
ISN 0127           77 CONTINUE
ISN 0128              SBETA=0.
ISN 0129              P1(IMAX)=0.0
ISN 0130              P2(IMAX)=0.0
ISN 0131              IM1=IMAX-1
ISN 0132              NK=IMAX-2
ISN 0133              DLD=FLOAT(IM1)
ISN 0134              VOLT=DLD*DZ
ISN 0135              CALL MAT
```

```
ISN 0136        31 DO 33 I=1,IM1
ISN 0137           P1(I)=SI
ISN 0138        33 P2(I)=SI
ISN 0139           P1(1)=0.0
ISN 0140           P2(1)=0.0
ISN 0141           CALL INIZ
ISN 0142           CALL STAMPA(2)
ISN 0143           CALL STAMPA(3)
ISN 0144           IF(ITCR)35,35,34
ISN 0145        34 CALL CRITIC
ISN 0146           CALL STAMPA(2)
ISN 0147           CALL STAMPA(3)
ISN 0148           DO 351 I=1,IMAX
ISN 0149       351 P2S(I)=AB2(I)
ISN 0150        35 CONTINUE
ISN 0151           DELT=DATA(1)
ISN 0152           K=0
ISN 0153        80 K=K&1
ISN 0154           IF(K.GT.NRIT)GO TO 81
ISN 0156           DLDT(K)=DL(K)*DELT
ISN 0157           DETA(K)=BETA(K)*DELT*0.5
ISN 0158           SBETA=SBETA&BETA(K)
ISN 0159           GO TO 80
ISN 0160        81 CONTINUE
ISN 0161           CALL MAT
ISN 0162           IF(ICAN.LE.0)GO TO 1009
ISN 0164           DT=1.0
ISN 0165           CALL DCAN
ISN 0166      1010 GO TO (1100,1101),ICAN
ISN 0167      1100 CALL CANCIL(0.0)
ISN 0168           GO TO 1103
ISN 0169      1101 CALL CANSL(0.0)
ISN 0170      1103 CONTINUE
ISN 0171           DO 150 I=1,IMAX
ISN 0172           TMUI(I)=TMU(I)
ISN 0173       150 TCI(I)=TP(NP3,I)
ISN 0174      1009 CONTINUE
ISN 0175           IDIR=DATA(12)&0.1
ISN 0176           KS=0
ISN 0177           KBAR=0
ISN 0178           TBA=0.0
ISN 0179           SPB=DATA(1620)
ISN 0180           VBAR=DATA(1700)
ISN 0181           DT=FLOAT(KPC)*DELT
ISN 0182           CALL TEST
ISN 0183           KST=1851
ISN 0184      1000 CONTINUE
ISN 0185           KTP=DATA(KST)&0.0001
ISN 0186           IF(KTP)106,106,127
ISN 0187       127 I1P=DATA(KST&1)&0.0001
```

```
ISN 0188          IS1=DATA(KST&2)&0.0001
ISN 0189          I2P=DATA(KST&3)&0.0001
ISN 019C          IS2=DATA(KST&4)&0.0001
ISN 0191          DO 13 KK =1,KTP,I2P
ISN 0192          DO 14  L =1,I2P,IIP
ISN 0193          DO 15 MM =1,IIP
ISN 0194          IT=IT&1
ISN 0195          TO=DELT*(FLOAT(IT)&0.001)
ISN 0196          IF( ICAN)1011,1011,1015
ISN 0197     1015 CONTINUE
ISN 0198          KCAN=KCAN&1
ISN 0199          IF(KCAN-KPC)1011,1012,1012
ISN 0200     1012 KCAN=0
ISN 0201          GO TO (1104,1105),ICAN
ISN 0202     1104 CALL CANCIL(1.0)
ISN 0203          GO TO 1106
ISN 0204     1105 CALL CANSL(1.0)
ISN 0205     1106 CONTINUE
ISN 0206          CALL MAT
ISN 0207          KMAP=KMAP&1
ISN 0208          IF(KMAP-KMA1)1011,1108,1108
ISN 0209     1108 KMAP=0
ISN 0210          CALL STAMPA(4)
ISN 0211     1011 CONTINUE
ISN 0212          IF(TO-TBA)50,51,51
ISN 0213       51 KBAR=KBAR&1
ISN 0214          TBAR=TBA
ISN 0215          WBAR=VBAR
ISN 0216          TBA=DATA(KBAR&1620)
ISN 0217          VBAR=DATA(KBAR&1700)
ISN 0218          DBAR=(VBAR-WBAR)/(TBA-TBAR)
ISN 0219          IF(TBA.GT.0.0) GO TO 151
ISN 0221          TBA=1000.0
ISN 0222          DBAR=0.0
ISN 0223      151 WRITE (6,58) TO,WBAR
ISN 0224       58 FORMAT (1HO///5X,4HTO =F8.3,10X,6HVBAR =E12.5)
ISN 0225          GO TO 54
ISN 0226       50 IF(DBAR.EQ.0.0) GO TO 53
ISN 0228       54 DINS=WBAR&DBAR*(TO-TBAR)
ISN 0229          IF( IDIR)56,56,55
ISN 0230       56 DO 57 M=1,NREG
ISN 0231          ID=I2(M)-1
ISN 0232          IS=I1(M)&1
ISN 0233          VEL =DINS*DATA(M&1780)
ISN 0234          VEL1=DINS*DATA(M&1781)
ISN 0235          AB2(ID&1)=0.5*(VEL&VEL1)&P2S(ID&1)
ISN 0236          DO 57 I=IS,ID
ISN 0237       57 AB2(I)=VEL&P2S(I)
ISN 0238          GO TO 53
ISN 0239       55 CALL BARRE
```

```
ISN 0240    53 DO 12 I=1,IMAX
ISN 0241       EP2(I)=BE2(I-1)&BE2(I)&(AL2(I)&AL2(I-1))*DZ2&AB2(I)*DZ        MAIN
ISN 0242       SRIT=0.
ISN 0243       K=0
ISN 0244    73 K=K&1
ISN 0245       IF(K.GT.NRIT)GO TO 84
ISN 0247       SRIT=SRIT&DL(K)*C(K,I)
ISN 0248       GOTO 73
ISN 0249    84 CONTINUE
ISN 0250       TN1(I)=SRIT*DZ&DER1(I)*P1(I)&SORM(I)
ISN 0251    12 TN2(I)=DER2(I)*P2(I)
ISN 0252       CALL FLUSSI
ISN 0253       PINT=PINT&PM2*DELT
ISN 0254       IF(NRIT.LE.0)GOTO 85
ISN 0256       DO 30 I=2,IMAX
ISN 0257       DO 74 K=1,NRIT
ISN 0258    74 C(K,I)=C(K,I)-DLDT(K)*C(K,I)&COC(K,I)*P2(I)&COC1(K,I)*P1(I)
ISN 0259    30 CONTINUE
ISN 0260       DO 75 K=1,NRIT
ISN 0261    75 C(K,1)=0.0
ISN 0262    85 CONTINUE
ISN 0263       IF(KTE) 120,120,121
ISN 0264   121 CALL TEST
ISN 0265   120 CONTINUE
ISN 0266    15 CONTINUE
ISN 0267       CALL STAMPA(IS1)
ISN 0268    14 CONTINUE
ISN 0269       CALL STAMPA(IS2)
ISN 0270    13 CONTINUE
ISN 0271       KST=KST&6
ISN 0272       GO TO 1000
ISN 0273   106 CALL STAMPA(2)
ISN 0274       IF(LAST)110,110,9000
ISN 0275  9000 STOP
ISN 0276       END
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
          C
ISN 0002          SUBROUTINE FLUSSI
ISN 0003          REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004          COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005          COMMON/CDATA/DATA(3500)
ISN 0006          COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SF1(12),SA(1
         12),SPR(12),C(10,100),                     P1S(100),P2S(100),SOR(12),SOR
         2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
         3VOLT,AL2(100),AB2(100),                      DLD,DER1(100),DER2(100),C
         4OC(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
         5L2(100),DLM,DEM1(100),DEM2(100)              ,EP1(100),BI1(100),BI2(
         6100),              INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
         70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
         8              AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
         9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
         A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
         BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
         C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
         DI(100),SFI1(100),            COC1(10,100)
ISN 0007          REAL*8 AA1,AA2,BB1,BB2,WL11,WL12,WL21,WL22,W11,W12,W21,W22,WW
ISN 0008          DIMENSION AA1(2,100),AA2(2,100),BB1(100),BB2(100)
ISN 0009          PMPT=PM2
ISN 0010          AA1(1,1)=0.0
ISN 0011          AA1(2,1)=0.0
ISN 0012          AA2(1,1)=0.0
ISN 0013          AA2(2,1)=0.0
ISN 0014          BB1(1)=0.0
ISN 0015          BB2(1)=0.0
ISN 0016          DO 1 I=2,IM1
ISN 0017          WL11=EP1(I)-BE1(I-1)*AA1(1,I-1)
ISN 0018          WL12=-BI1(I)-BE1(I-1)*AA1(2,I-1)
ISN 0019          WL21=-BI2(I)-BE2(I-1)*AA2(1,I-1)
ISN 0020          WL22=EP2(I)-BE2(I-1)*AA2(2,I-1)
ISN 0021          WW=WL11*WL22-WL12*WL21
ISN 0022          W11=WL22/WW
ISN 0023          W12=-WL12/WW
ISN 0024          W21=-WL21/WW
ISN 0025          W22=WL11/WW
ISN 0026          AA1(1,I)=W11*BE1(I)
ISN 0027          AA1(2,I)=W12*BE2(I)
ISN 0028          AA2(1,I)=W21*BE1(I)
ISN 0029          AA2(2,I)=W22*BE2(I)
ISN 0030          WL11=TN1(I)&BE1(I-1)*BB1(I-1)
ISN 0031          WL21=TN2(I)&BE2(I-1)*BB2(I-1)
ISN 0032          BB1(I)=W11*WL11&W12*WL21
ISN 0033          BB2(I)=W21*WL11&W22*WL21
ISN 0034        1 CONTINUE
ISN 0035          P1(IM1)=BB1(IM1)
ISN 0036          P2(IM1)=BB2(IM1)
```

```
ISN 0037          PM2=P2(IM1)
ISN 0038          PM1=P1(IM1)
ISN 0039          I=IM1
ISN 0040          DO 2 J=2,NK
ISN 0041          I=I-1
ISN 0042          P1(I)=AA1(1,I)*P1(I&1)&AA1(2,I)*P2(I&1)&BB1(I)
ISN 0043          P2(I)=AA2(1,I)*P1(I&1)&AA2(2,I)*P2(I&1)&BB2(I)
ISN 0044          PM2=PM2&P2(I)
ISN 0045        2 PM1=PM1&P1(I)
ISN 0046          PM1=PM1/DLD
ISN 0047          PM2=PM2/DLD
ISN 0048          RETURN
ISN 0049          END
```

```
                      C
ISN 0002                     SUBROUTINE MAT
ISN 0003                     REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004                     COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005                     COMMON/CDATA/DATA(3500)
ISN 0006                     COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                            1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                            2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007                     COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SP(12),SFI(12),SA(1
                            12),SPR(12),C(10,100),                    P1S(100),P2S(100),SOR(12),SOR
                            2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                            3VOLT,AL2(100),AB2(100),                   DLD,DER1(100),DER2(100),C
                            40C(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
                            5L2(100),DLM,DEM1(100),DEM2(100)           ,EP1(100),BI1(100),BI2(
                            6100),           INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                            70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
                            8                  AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
                            9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                            A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                            BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                            C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                            DI(100),SFI1(100),                 COC1(10,100)
ISN 0008                     DO 1 M=1,NREG
ISN 0009                     ID=I2(M)-1
ISN 0010                     IS=I1(M)
ISN 0011                     DO 2 I=IS,ID
ISN 0012                     D1P=D1(M)&(D1CU(M)*DITMU(I)&D1CO(M)*DITCO(I))*D1(M)
ISN 0013                     D2P=D2(M)&(D2CU(M)*DITMU(I)&D2CO(M)*DITCO(I))*D2(M)
ISN 0014                     FIS=SF(M)&SF(M)*(SFCU(M)*DITMU(I)&SFCO(M)*DITCO(I))
ISN 0015                     SRP=SR(M)&SR(M)*(SRCU(M)*DITMU(I)&SRCO(M)*DITCO(I))
ISN 0016                     SAP=SA(M)
ISN 0017                     SPRP=SPR(M)&SA(M)*(SPRCU(M)*DITMU(I)&SPRCO(M)*DITCO(I))
ISN 0018                     FIS1=SF1(M)&SF1(M)*(SF1CU(M)*DITMU(I)&SF1CO(M)*DITCO(I))
ISN 0019                     WP=W(M)&(WCU(M)*DITMU(I)&WCO(M)*DITCO(I))*W(M)
ISN 0020                     VP=V(M)&(VCU(M)*DITMU(I)&VCO(M)*DITCO(I))*V(M)
ISN 0021                     PP=P(M)&(PCU(M)*DITMU(I)&PCO(M)*DITCO(I))*P(M)
ISN 0022                     SFI(I)=FIS
ISN 0023                     SFI1(I)=FIS1
ISN 0024                     AL1(I)=SRP&D1P*BU&1.0/(WP*DELT)-FIS1*(1.0-SBETA)
ISN 0025                     AL2(I)=SAP&SPRP&D2P*BU&1.0/(VP*DELT)
ISN 0026                     BL1(I)=FIS*(1.0-SBETA)
ISN 0027                     BL2(I)=PP*SRP
ISN 0028                     DEM1(I)=1.0/(WP*DELT)
ISN 0029                     DEM2(I)=1.0/(VP*DELT)
ISN 0030                     BE1(I)=D1P/DZ
ISN 0031                     BE2(I)=D2P/DZ
ISN 0032                     EP1(I)=BE1(I-1)&BE1(I)&(AL1(I)&AL1(I-1))*DZ2
ISN 0033                     BI1(I)=(BL1(I)&BL1(I-1))*DZ2
ISN 0034                     BI2(I)=(BL2(I)&BL2(I-1))*DZ2
```

```
ISN 0035          DER1(I)=(DEM1(I)&DEM1(I-1))*DZ2
ISN 0036          DER2(I)=(DEM2(I)&DEM2(I-1))*DZ2
ISN 0037          IF(NRIT.LE.0)GOTO 2
ISN 0039          DO 4 K=1,NRIT
ISN 0040          COC1(K,I)=DETA(K)*(FIS1&SFI1(I-1))
ISN 0041        4 COC(K,I)=DETA(K)*(FIS&SFI(I-1))
ISN 0042        2 CONTINUE
ISN 0043        1 CONTINUE
ISN 0044          RETURN
ISN 0045          END
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
                        C
ISN 0002                      SUBROUTINE INIZ
ISN 0003                      REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004                      COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005                      COMMON/CDATA/DATA(3500)
ISN 0006                      COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SF1(12),SA(1
                             12),SPR(12),C(10,100),                    P1S(100),P2S(100),SOR(12),SOR
                             2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                             3VOLT,AL2(100),AB2(100),             DLD,DER1(100),DER2(100),C
                             4OC(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
                             5L2(100),DLM,DEM1(100),DEM2(100)        EP1(100),BI1(100),BI2(
                             6100),            INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                             70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
                             8                  AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
                             9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                             A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                             BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                             C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                             DI(100),SFI1(100),            COCI(10,100)
ISN 0007                      DO 2 I=1,IMAX
ISN 0008                    2 EP2(I)=BE2(I-1)&BE2(I)&(AL2(I)&AL2(I-1))*DZ2
ISN 0009                      DO 1 K=1,IDST
ISN 0010                      DO 7 I=1,IMAX
ISN 0011                      TN1(I)=           DER1(I)*P1(I)&SORM(I)
ISN 0012                    7 TN2(I)=DER2(I)*P2(I)
ISN 0013                      CALL FLUSSI
ISN 0014                      IF(SI.LE.0.0)GOTO 10
ISN 0016                      FN=SI/PM2
ISN 0017                      DO 3 I=1,IMAX
ISN 0018                      P2(I)=P2(I)*FN
ISN 0019                    3 P1(I)=P1(I)*FN
ISN 0020                    1 CONTINUE
ISN 0021                      PMPT=FN
ISN 0022                      PM2=SI
ISN 0023                      PM1=FN*PM1
ISN 0024                   10 CONTINUE
ISN 0025                      IF(NRIT.LE.0)RETURN
ISN 0026                      DO 5 I=2,IM1
ISN 0027                      DO 5 K=1,NRIT
ISN 0028
ISN 0029                    5 C(K,I)=DETA(K)*(P2(I)*(SFI(I)&SFI(I-1))&P1(I)*(SFI1(I)&SFI1(I-1)))
ISN 0030                      RETURN
ISN 0031                      END
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

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        C
ISN 0002          SUBROUTINE CRITIC
ISN 0003          REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004          COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005          COMMON/CDATA/DATA(3500)
ISN 0006          COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
         1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
         2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007          COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SF1(12),SA(1
         12),SPR(12),C(10,100),                       P1S(100),P2S(100),SOR(12),SOR
         2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
         3VOLT,AL2(100),AB2(100),                      DLD,DER1(100),DER2(100),C
         4OC(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
         5L2(100),DLM,DEM1(100),DEM2(100)             EP1(100),BI1(100),BI2(
         6100),               INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
         7C),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
         8                   AL22(100),DINS,SPRCU(12),PRCO(12),SPRMO(12),
         9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
         A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
         BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
         C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
         DI(100),SFI1(100),              COC1(10,100)
ISN 0008          WRITE (6,204)
ISN 0009      204 FORMAT (1H0///,5X,18H RICERCA CRITICITA)
ISN 0010          DO 1 I=1,NREG
ISN 0011        1 KV(I)=DATA(I&1600)
ISN 0012          SPRG=DATA(1611)
ISN 0013          DAPF=DATA(1612)
ISN 0014          LF=DATA(1613)&0.0001
ISN 0015          IF(IDIR)2,2,21
ISN 0016       21 SPB=DATA(1614)
ISN 0017          WRITE (6,22) SPB
ISN 0018       22 FORMAT (1H ////35H   BARRE A BANCO  -SEZIONE DI VELENOE12.4)
ISN 0019          GO TO 23
ISN 0020        2 CONTINUE
ISN 0021          WRITE (6,30) (KV(I),I=1,NREG)
ISN 0022       30 FORMAT (1H //////,22H  REGIONI AVVELENATE  ,7I10)
ISN 0023       23 CONTINUE
ISN 0024          WRITE (6,31) SPRG,DAPF,LF,ITCR
ISN 0025       31 FORMAT (1H0///,10X,6HSPRG =E14.5,4X,6HDAPF =E14.5,4X,4HLF =I5,4X,6
         1HITCR =I5/////)
ISN 0026          L1=0
ISN 0027          SP1=0.
ISN 0028          SPCR=0.
        C
ISN 0029          WRITE (6,203)
ISN 0030      203 FORMAT (1H0///,5X,10HITERAZIONI,14X,3HPM2,14X,3HREP,11X,6HVELENO)
ISN 0031     1000 CONTINUE
ISN 0032          L1=L1&1
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```
ISN 0033          IF( IDIR )50,50,51
ISN 0034       50 DO 4 M=1,NREG
ISN 0035          KVM=KV(M)
ISN 0036          IF(M-KVM)5,5,4
ISN 0037        5 SPR(M)=SPCR&P1S(M)
ISN 0038        4 CONTINUE
ISN C039          CALL MAT
ISN 0040          DO 6 I=1,IMAX
ISN 0041        6 EP2(I)=BE2(I-1)&BE2(I)&(AL2(I)&AL2(I-1))*DZ2
ISN 0042          GO TO 52
ISN 0043       51 DINS=SPCR
ISN 0044          CALL BARRE
ISN 0045          SPCR=DINS
ISN 0046          CALL MAT
ISN 0047          DO 53 I=1,IMAX
ISN 0048       53 EP2(I)=BE2(I-1)&BE2(I)&(AL2(I)&AL2(I-1))*DZ2&AB2(I)*DZ
ISN 0049       52 PMPC=PM2
ISN 0050          DO 20 I=1,IMAX
ISN 0051          TN1(I)=DER1(I)*P1(I)
ISN 0052       20 TN2(I)=DER2(I)*P2(I)
ISN 0053       77 CALL FLUSSI
ISN 0054          DP=(PM2-PMPC)/DELT
ISN 0055          REP=(DP*2.)/(PM2&PMPC)
ISN 0056        7 CONTINUE
ISN 0057          IF(L1-1)14,14,15
ISN 0058       14 CONTINUE
ISN 0059          SP1=SPCR
ISN 0060          REP1=REP
ISN 0061          SPCR=SPRG
ISN 0062          GO TO 1000
ISN 0063       15 DAP=ABS(REP)
ISN 0064          IF(DAPF-DAP)9,10,10
ISN 0065        9 IF(LF-L1)10,10,11
ISN 0066       11 TG=(SPCR-SP1)/(REP-REP1)
ISN 0067          SP1=SPCR
ISN 0068          SPCR=SPCR-TG*REP
ISN 0069          REP1=REP
ISN 0070          DELT=0.01/DAP
ISN 0071          IF(DELT.GT.1.0)DELT=1.0
ISN 0073          GO TO 1000
ISN 0074       10 CONTINUE
ISN 0075          WRITE (6,3) L1,PM2,REP,SPCR
ISN 0076        3 FORMAT (1H ,I10,10X,3E16.5)
ISN 0077          FN=SI/PM2
ISN 0078          PMPT=FN*PMPT
ISN 0079          PM1=PM1*FN
ISN 0080          PM2=SI
ISN 0081          DO 93 I=1,IMAX
ISN 0082          P2(I)=P2(I)*FN
ISN 0083       93 P1(I)=P1(I)*FN
```

```
ISN 0084          IF(NRIT.LE.0)RETURN
ISN 0086          DO 100 I=2,IM1
ISN 0087          DO 100 K=1,NRIT
ISN 0088    100 C(K,I)=DETA(K)*(P2(I)*(SFI(I)&SFI(I-1))&P1(I)*(SFI1(I)&SFI1(I-1)))
ISN 0089          RETURN
ISN 0090          END
```

COMPILER OPTIONS - NAME= MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
              C
ISN 0002              SUBROUTINE BARRE
ISN 0003              REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004              COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005              COMMON/CDATA/DATA(3500)
ISN 0006              COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SF1(12),SA(1
             12),SPR(12),C(10,100),                     P1S(100),P2S(100),SOR(12),SOR
             2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
             3VOLT,AL2(100),AB2(100),                    DLD,DER1(100),DER2(100),C
             40C(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
             5L2(100),DLM,DEM1(100),DEM2(100)           ,EP1(100),BI1(100),BI2(
             6100),              INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
             70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
             8              AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
             9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
             A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
             BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
             C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
             DI(100),SFI1(100),             COC1(10,100)
              C
ISN 0007              IF(DINS.GT.VOLT)DINS=VOLT
ISN 0009              IF(DINS.LT.0.0)DINS=0.0
ISN 0011              IBAR=DINS/DZ
ISN 0012              FRAC=DINS/DZ-FLOAT(IBAR)
ISN 0013              GO TO(1,2),IDIR
ISN 0014            1 K=0
ISN 0015          101 K=K&1
ISN 0016              IF(K.GT.IBAR) GO TO 3
ISN 0018              AB2(K)=SPB
ISN 0019              GO TO 101
ISN 0020            3 IF(FRAC-0.5) 4,5,5
ISN 0021            4 AB2(K)=0.5*(1.0&FRAC)*SPB
ISN 0022              GO TO 6
ISN 0023            5 AB2(K)=SPB
ISN 0024              K=K&1
ISN 0025              AB2(K)=C.5*(FRAC-0.5)*SPB
ISN 0026            6 K=K&1
ISN 0027              IF(K.GT.IM1) RETURN
ISN 0029              AB2(K)=0.0
ISN 0030              GO TO 6
ISN 0031            2 IBAR=IMAX-IBAR
ISN 0032              K=IMAX&1
ISN 0033            7 K=K-1
ISN 0034              IF(K.LE.IBAR) GO TO 8
ISN 0036              AB2(K)=SPB
ISN 0037              GO TO 7
ISN 0038            8 IF(FRAC-0.5) 9,10,10
ISN 0039            9 AB2(K)=0.5*(1.0&FRAC)*SPB
ISN 0040              GO TO 11
```

```
ISN 0041        10 AB2(K)=SPB
ISN 0042           K=K-1
ISN 0043           AB2(K)=0.5*(FRAC-0.5)*SPB
ISN 0044        11 K=K-1
ISN 0045           IF(K.LE.1) RETURN
ISN 0047           AB2(K)=0.0
ISN 0048           GO TO 11
ISN 0049           END
```

```
          C
ISN 0002          SUBROUTINE STAMPA(IS)
ISN 0003          REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004          COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005          COMMON/CDATA/DATA(3500)
ISN 0006          COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                 1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                 2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007          COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SFI(12),SA(1
                 12),SPR(12),C(10,100),                   P1S(100),P2S(100),SOR(12),SOR
                 2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                 3VOLT,AL2(100),AB2(100),              DLD,DER1(100),DER2(100),C
                 4OC(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
                 5L2(100),DLM,DEM1(100),DEM2(100)             ,EP1(100),BI1(100),BI2(
                 6100),                INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                 70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,LI,SP1,REP,SPCR,
                 8                    AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
                 SPCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                 A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                 BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                 C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                 CI(100),SFI1(100),                   COC1(10,100)
ISN 0008   C      DIMENSION VR(12),FLM1(12),FLM2(12)
          C
ISN 0009          GO TO (10,20,30,40,50),IST
ISN 0010       10 CP=(PM2-PMPT)/DELT
ISN 0011          PER=(PM2&PMPT)/(DP*2.)
ISN 0012          WRITE (6,1) TO,PM1,PM2,PER
ISN 0013        1 FORMAT (1H0////,4X,4HTO =,F10.5,4X,5HPM1 =,E12.5,4X,5HPM2 =,E12.5,
                 14X,5HPER =,E12.5)
ISN 0014          GO TO 100
ISN 0015       20 DP=(PM2-PMPT)/DELT
ISN 0016          PER=(PM2&PMPT)/(DP*2.)
ISN 0017          WRITE (6,2) TO,IT,PER,PINT,INTER
ISN 0018        2 FORMAT (1H0////////,4X,4HTO =,F10.5,3X,4HIT =,I6,4X,5HPER =,E12.5,
                 14X,6HPINT =,E12.5,4X,5HINT =,I3)
ISN 0019          WRITE (6,3)
ISN 0020        3 FORMAT (1H ///,14X,2HP1,14X,2HP2,12X,6HVELENO,///)
ISN 0021          WRITE (6,4) (I,P1(I),P2(I),AB2(I),I=1,IMAX)
ISN 0022        4 FORMAT (1H ,I5,3E16.5)
ISN 0023          WRITE (6,5) PM1,PM2
ISN 0024        5 FORMAT (1H0,6H MEDIE,2E16.5)
ISN 0025          IF(NRIT.LE.0)GOTO 100
ISN 0027          WRITE (6,9)
ISN 0028        9 FORMAT (1H ///,14X,2HC1,14X,2HC2,14X,2HC3,14X,2HC4,14X,2HC5,14X,2H
                 1C6,//)
ISN 0029          DO 11 I=1,IMAX
ISN 0030       11 WRITE (6,12) I,(C(K,I),K=1,6)
ISN 0031       12 FORMAT (I5,6E16.5)
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ISN 0032          IF(NRIT-6)105,105,101
ISN 0033      101 WRITE (6,102)
ISN 0034      102 FORMAT (1H //,14X,2HC7,14X,2HC8,14X,2HC9,14X,3HC10,//)
ISN 0035          DO 111 I=1,IMAX
ISN 0036      111 WRITE (6,12) I,(C(K,I),K=7,NRIT)
ISN 0037      105 CONTINUE
ISN 0038          GO TO 100
ISN 0039       30 DP=(PM2-PMPT)/DELT
ISN 0040          PER=(PM2&PMPT)/(DP*2.0)
ISN 0041          DO 8 M=1,NREG
ISN 0042          ID=I2(M)-1
ISN 0043          IS=I1(M)&1
ISN 0044          FL1=P1(IS-1)*0.5
ISN 0045          FL2=P2(IS-1)*0.5
ISN 0046          DO 1050 I=IS,ID
ISN 0047          FL1=FL1&P1(I)
ISN 0048     1050 FL2=FL2&P2(I)
ISN 0049          FL1=FL1&P1(ID&1)*0.5
ISN 0050          FL2=FL2&P2(ID&1)*0.5
ISN 0051          VIR=I2(M)-I1(M)
ISN 0052          FLM1(M)=FL1/VIR
ISN 0053        8 FLM2(M)=FL2/VIR
ISN 0054          WRITE (6,1) TO,PM1,PM2,PER
ISN 0055          WRITE (6,6) (FLM1(M),M=1,NREG)
ISN 0056        6 FORMAT (2X,4HFLM1/(6E15.4))
ISN 0057          WRITE (6,7) (FLM2(M),M=1,NREG)
ISN 0058        7 FORMAT (2X,4HFLM2/(6E15.4))
ISN 0059          GO TO 100
ISN 0060       40 WRITE (6,1110) ITIPO,TO
ISN 0061     1110 FORMAT (1H0////14H CANALE TIPO  I1,5X,4HTO =F8.3//)
ISN 0062          DO 1111 J=1,IMAX
ISN 0063     1111 WRITE (6,1112) J,(TP(K,J),K=1,NP3)
ISN 0064     1112 FORMAT (1H0,I5,10F10.3)
ISN 0065          GO TO 100
ISN 0066       50 CONTINUE
ISN 0067      100 CONTINUE
ISN 0068          RETURN
ISN 0069          END
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
              C
ISN 0002              SUBROUTINE DCAN
ISN 0003              REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004              COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005              COMMON/CDATA/DATA(3500)
ISN 0006              COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
             1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
             2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007              COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SFI(12),SA(1
             12),SPR(12),C(10,100),                        P1S(100),P2S(100),SOR(12),SOR
             2M(100),IMAX,DLOT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
             3VOLT,AL2(100),AB2(100),                      DLD,DER1(100),DER2(100),C
             40C(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
             5L2(100),DLM,DEM1(100),DEM2(100)              ,EP1(100),BI1(100),BI2(
             6100),            INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
             70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
             8                 AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
             9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
             A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
             BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SFICU(12),SFICO(12
             C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
             CI(100),SFI1(100),                 COC1(10,100)
ISN 0008              ITIPO=ICAN
ISN 0009              N=DATA(2502)&0.1
ISN 0010              NS=IMAX
ISN 0011              NP1=N&1
ISN 0012              NP2=N&2
ISN 0013              NP3=N&3
ISN 0014              DO 62 J=1,NP3
ISN 0015         62   TP(J,1)=0.0
ISN 0016              FN=FLOAT(N)
ISN 0017              DRU=DATA(2503)/(2.0*FN)
ISN 0018              DO 12 I=1,N
ISN 0019         12   DR(I)=DRU
ISN 0020              DR(NP1)=DATA(2504)
ISN 0021              DR(NP2)=DATA(2505)
ISN 0022              DR(NP3)=DATA(2506)
ISN 0023              R(1)=DR(1)
ISN 0024              DO 13 I=2,NP3
ISN 0025         13   R(I)=R(I-1)&DR(I)
ISN 0026              DO 14 I=1,N
ISN 0027              RO(I)=DATA(2507)
ISN 0028              SC(I)=DATA(2511)
ISN 0029         14   VL(I)=2.0*DATA(2515)/(DR(I)&DR(I&1))
ISN 0030              RO(NP1)=DATA(2508)
ISN 0031              RO(NP2)=DATA(2509)
ISN 0032              RO(NP3)=DATA(2510)
ISN 0033              SC(NP1)=DATA(2512)
ISN 0034              SC(NP2)=DATA(2513)
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ISN 0035          SC(NP3)=DATA(2514)
ISN 0036          RU=DR(N)/(2.0*DATA(2515))
ISN 0037          RP=DR(NP1)/(2.0*DATA(2516))
ISN 0038          RS=DR(NP2)/(2.0*DATA(2517))
ISN 0039          VL(N)=1.0/(RU&RP)
ISN 0040          VL(NP1)=1.0/(RP&RS)
ISN 0041          VLR=DATA(2518)
ISN 0042          RR=1.0/VLR
ISN 0043          VL(NP2)=1.0/(RS&RR)
ISN 0044          DX=DZ
ISN 0045          FAC=0.0
ISN 0046          DO 1 I=1,IM1
ISN 0047        1 FAC=FAC&0.5*(SFI(I)*(P2(I&1)&P2(I))&SFI1(I)*(P1(I&1)&P1(I)))
ISN 0048          GO TO (2,3),ITIPO
ISN 0049        2 FAC=POWER/(FAC*DZ*6.2832*R(N)*R(N))
ISN 0050          PFAC(1)=FAC*DR(1)*DR(1)
ISN 0051          DO 4 J=2,N
ISN 0052        4 PFAC(J)=FAC*DR(J)*(2.0*R(J-1)&DR(J))
ISN 0053          GO TO 5
ISN 0054        3 FAC=POWER/(FAC*DZ*DATA(2520)*DATA(2503))
ISN 0055          DO 6 J=1,N
ISN 0056        6 PFAC(J)=FAC*DR(J)
ISN 0057        5 CONTINUE
ISN 0058          RETURN
ISN 0059          END
```

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                  C
ISN 0002                  SUBROUTINE CANCIL(FVI)
                  C       CANCIL
ISN 0003                  REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004                  COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005                  COMMON/CDATA/DATA(3500)
ISN 0006                  COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                         1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                         2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007                  COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SFI(12),SA(1
                         12),SPR(12),C(10,100),                     P1S(100),P2S(100),SOR(12),SOR
                         2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                         3VOLT,AL2(100),AB2(100),                      DLD,DER1(100),DER2(100),C
                         40C(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
                         5L2(100),DLM,DEM1(100),DEM2(100)                 ,EP1(100),BI1(100),BI2(
                         6100),         INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                         70),NRIT,SBETA,IDST,SI,IITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
                         8                  AL22(100),DINS,SPRCU(12), PRCO(12),SPRMO(12),
                         9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                         A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                         BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                         C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                         DI(100),SFI1(100),                COC1(10,100)
ISN 0008                  DIMENSION TPP(100),CI(10),DI(10),BI(10),AI(10),A(10),B(10),CA(10),
                         1TN(10)
ISN 0009                  DIMENSION PZ(10)
ISN 0010                  NVI=FVI&1.1
ISN 0011                  T=TO
ISN 0012                  DO 61 I=1,NS
ISN 0013               61 TPP(I)=TP(NP3,I)
ISN 0014                  CALL VINIZ
ISN 0015                  TP(NP3,1)=TPI
ISN 0016                  DO 150 I=2,NS
ISN 0017                  DO 150 K=1,N
ISN 0018              150 POW(K,I)=PFAC(K)*(SFI(I-1)*(P2(I)&P2(I-1))*0.5&0.5*SFI1(I-1)*(P1(I
                         1)&P1(I-1)))
ISN 0019                  F=3.14159*DR(NP3)*(R(NP3)&R(NP2))*RO(NP3)*WS
ISN 0020                  CI(1)=VL(1)*R(1)
ISN 0021                  DI(1)=FVI*RO(1)*SC(1)*R(1)*R(1)/(2.0*DT)
ISN 0022                  BI(1)=-(CI(1)&DI(1))
ISN 0023                  DO 11 I=2,NP1
ISN 0024                  AI(I)=VL(I-1)*R(I-1)
ISN 0025                  CI(I)=VL(I)*R(I)
ISN 0026                  DI(I)=FVI*RO(I)*SC(I)*DR(I)*(R(I-1)&0.5*DR(I))/DT
ISN 0027               11 BI(I)=-(AI(I)&CI(I)&DI(I))
ISN 0028                  AI(NP2)=VL(NP1)*R(NP1)
ISN 0029                  CI(NP2)=VL(NP2)*R(NP2)
ISN 0030                  DI(NP2)=FVI*RO(NP2)*SC(NP2)*DR(NP2)*(R(NP1)&0.5*DR(NP2))/DT
ISN 0031                  BI(NP2)=-(AI(NP2)&CI(NP2)&DI(NP2))
```

```
ISN 0032            AI(NP3)=VL(NP2)*R(NP2)
ISN 0033            DI(NP3)=FVI*RO(NP3)*SC(NP3)*DR(NP3)*(R(NP2)&0.5*DR(NP3))/DT
ISN 0034            G=SC(NP3)*F/(3.14159*DZ)
ISN 0035            E=-0.5*G
ISN 0036            BI(NP3)=-(AI(NP3)&0.5*G&DI(NP3))
ISN 0037         54 CONTINUE
ISN 0038            DO 17 I=2,NS
ISN 0039            IF(DATA(2516)*DATA(2518).GT.1.0E-07)GO TO 4
ISN 0041            IF(FVI.GT.0.1)GO TO 1010
ISN 0043            PZ(1)=POW(1,I)
ISN 0044            DO 1000 K=2,N
ISN 0045       1000 PZ(K)=PZ(K-1)&POW(K,I)
ISN 0046            TP(NP3,I)=TP(NP3,I-1)&2.0*PZ(N)/G
ISN 0047            IF(DATA(2518).GT.1.0E-07)GO TO 1002
ISN 0049            CALL HTC(TP(NP3,I))
ISN 0050            RR=1.0/VLT
ISN 0051            IF(DATA(2516).GT.1.0E-07)GO TO 105
ISN 0053       1002 TPG=TP(NP3,I)&PZ(N)/(RS&RR)
ISN 0054            KK=N-1
ISN 0055            TP(N,I)=0.0
ISN 0056            DO 1003 K=1,KK
ISN 0057            L=N-K
ISN 0058       1003 TP(L,I)=PZ(L)/CI(L)&TP(L&1,I)
ISN 0059            SUM=TP(1,I)*R(1)*R(1)
ISN 0060            DO 1004 J=2,KK
ISN 0061       1004 SUM=SUM&TP(J,I)*DR(J)*(R(J-1)&R(J))
ISN 0062            TMA=SUM/R(N)/R(N)
ISN 0063            ALF=PZ(N)*(RS/R(NP1)&RU/R(N))
ISN 0064            BET=PZ(N)*0.5*(1.0/R(NP1)&1.0/R(N))
ISN 0065            COST=DATA(2500)
ISN 0066            CALL GAPIZ (TMA,TPG,ALF,BET,RGAP,COST)
ISN 0067            GO TO 102
ISN 0068       1010 IF(DATA(2516).GT.1.0E-07)GO TO 3
ISN 0070        101 CALL GAP(TMU(I),TP(N,I),TP(NP2,I),RGAP)
ISN 0071        102 CONTINUE
ISN 0072            VL(N)=1.0/(RU&0.5*RGAP)
ISN 0073            VL(NP1)=1.0/(0.5*RGAP&RS)
ISN 0074            DO 5 K=N,NP1
ISN 0075            AI(K)=VL(K-1)*R(K-1)
ISN 0076            CI(K)=VL(K)&R(K)
ISN 0077          5 BI(K)=-(AI(K)&CI(K)&DI(K))
ISN 0078            AI(NP2)=VL(NP1)*R(NP1)
ISN 0079            BI(NP2)=-(AI(NP2)&CI(NP2)&DI(NP2))
ISN 0080          2 IF(DATA(2518).GT.1.0E-07)GO TO 4
ISN 0082          3 CALL HTC(TP(NP3,I))
ISN 0083        105 CONTINUE
ISN 0084            RR=1.0/VLT
ISN 0085            VL(NP2)=1.0/(RS&RR)
ISN 0086            CI(NP2)=VL(NP2)*R(NP2)
ISN 0087            AI(NP3)=VL(NP2)*R(NP2)
```

```
ISN 0088           E=-0.5*G
ISN 0089           BI(NP3)=-(AI(NP3)&0.5*G&DI(NP3))
ISN 0090         4 B(1)=BI(1)
ISN 0091           CA(1)=CI(1)
ISN 0092           DO 18 K=2,NP2
ISN 0093           A(K)=AI(K)
ISN 0094           B(K)=BI(K)
ISN 0095        18 CA(K)=CI(K)'
ISN 0096           DO 72 K=1,N
ISN 0097        72 TN(K)=-DI(K)*TP(K,I)-POW(K,I)
ISN 0098           A(NP3)=AI(NP3)
ISN 0099           B(NP3)=BI(NP3)
ISN 0100           TN(NP1)=-DI(NP1)*TP(NP1,I)
ISN 0101           TN(NP2)=-DI(NP2)*TP(NP2,I)
ISN 0102           TN(NP3)=-DI(NP3)*TP(NP3,I)&E*TP(NP3,I-1)
        C      RISOLUZIONE SISTEMA
ISN 0103           DO 19 K=2,NP3
ISN 0104           B(K)=B(K)-A(K)*CA(K-1)/B(K-1)
ISN 0105        19 TN(K)=TN(K)-A(K)*TN(K-1)/B(K-1)
ISN 0106           TP(NP3,I)=TN(NP3)/B(NP3)
ISN 0107           DO 20 K=1,NP2
ISN 0108           K1=NP3-K
ISN 0109        20 TP(K1,I)=TN(K1)/B(K1)-TP(K1&1,I)*CA(K1)/B(K1)
ISN 0110        17 CONTINUE
ISN 0111           CALL INTEGR
ISN 0112           IF(FVI)31,31,80
ISN 0113        31 WRITE (6,21) T
ISN 0114        33 DO 36 I=1,NS
ISN 0115        36 WRITE (6,23) (TP(J,I),J=1,NP3)
ISN 0116        23 FORMAT (1H0,10F10.3)
ISN 0117        21 FORMAT (1H0///5X,3HT =F8.3//)
ISN 0118           RETURN
ISN 0119        80 CONTINUE
ISN 0120           DO 81 I=1,NS
ISN 0121           DITMU(I)=TMU(I&1)-TMUI(I&1)
ISN 0122        81 DITCO(I)=0.5*(TP(NP3,I&1)&TP(NP3,I)-TCI(I&1)-TCI(I))
ISN 0123           RETURN
ISN 0124           END
```

```
                  C
ISN 0002                   SUBROUTINE CANSL (FVI)
                  C        CANSL
ISN 0003                   REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004                   COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005                   COMMON/CDATA/DATA(3500)
ISN 0006                   COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                          1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                          2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007                   COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SF1(12),SA(1
                          12),SPR(12),C(10,100),                   P1S(100),P2S(100),SOR(12),SOR
                          2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                          3VOLT,AL2(100),AB2(100),               DLD,DER1(100),DER2(100),C
                          40C(10,100),IT,TO,KBI,VBAR,EPA,I1(12),I2(12),W(12),V(12),AL1(100),B
                          5L2(100),DLM,DEM1(100),DEM2(100)              ,EP1(100),BI1(100),BI2(
                          6100),              INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                          70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
                          8               AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
                          9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                          A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                          BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                          C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                          D1(100),SF11(100),                  COC1(10,100)
ISN 0008                   DIMENSION PZ(10)
ISN 0009                   DIMENSION TPP(100),CI(10),DI(10),BI(10),AI(10),A(10),B(10),CA(10),
                          1TN(10)
ISN 0010                   NVI=FVI&1.1
ISN 0011                   T=TO
ISN 0012                   DO 61 I=1,NS
ISN 0013               61  TPP(I)=TP(NP3,I)
ISN 0014                   CALL VINIZ
ISN 0015                   TP(NP3,1)=TPI
ISN 0016                   DO 150 I=2,NS
ISN 0017                   DO 150 K=1,N
ISN 0018              150  POW(K,I)=PFAC(K)*(SF1(I-1)*(P2(I)&P2(I-1))*0.5&0.5*SF11(I-1)*(P1(I
                          1)&P1(I-1)))
ISN 0019                   CI(1)=VL(1)
ISN 0020                   DI(1)=FVI*RO(1)*SC(1)*DR(1)/DT
ISN 0021                   BI(1)=-(CI(1)&DI(1))
ISN 0022                   DO 11 I=2,NP1
ISN 0023                   AI(I)=VL(I-1)
ISN 0024                   CI(I)=VL(I)
ISN 0025                   DI(I)=FVI*RO(I)*SC(I)*DR(I)/DT
ISN 0026               11  BI(I)=-(AI(I)&CI(I)&DI(I))
ISN 0027                   AI(NP2)=VL(NP1)
ISN 0028                   CI(NP2)=VL(NP2)
ISN 0029                   DI(NP2)=FVI*RO(NP2)*SC(NP2)*DR(NP2)/DT
ISN 0030                   BI(NP2)=-(AI(NP2)&CI(NP2)&DI(NP2))
ISN 0031                   AI(NP3)=VL(NP2)
```

```
ISN 0032          DI(NP3)=FVI*RO(NP3)*SC(NP3)*DR(NP3)/DT
ISN 0033          G=SC(NP3)*RO(NP3)*WS*DR(NP3)/DZ
ISN 0034          BI(NP3)=-(AI(NP3)&G&DI(NP3))
ISN 0035       54 CONTINUE
ISN 0036          DO 17 I=2,NS
ISN 0037          IF(DATA(2516)*DATA(2518).GT.1.0E-07)GO TO 4
ISN 0039          IF(FVI.GT.0.1)GO TO 1010
ISN 0041          PZ(1)=POW(1,I)
ISN 0042          DO 1000 K=2,N
ISN 0043     1000 PZ(K)=PZ(K-1)&POW(K,I)
ISN 0044          TP(NP3,I)=TP(NP3,I-1)&2.0*PZ(N)/G
ISN 0045          IF(DATA(2518).GT.1.0E-07)GO TO 1002
ISN 0047          CALL HTC(TP(NP3,I))
ISN 0048          RR=1.0/VLT
ISN 0049          IF(DATA(2516).GT.1.0E-07)GO TO 105
ISN 0051     1002 TPG=TP(NP3,I)&PZ(N)/(RS&RR)
ISN 0052          KK=N-1
ISN 0053          TP(N,I)=0.0
ISN 0054          DO 1003 K=1,KK
ISN 0055          L=N-K
ISN 0056     1003 TP(L,I)=PZ(L)/CI(L)&TP(L&1,I)
ISN 0057          SUM=TP(1,I)
ISN 0058          DO 1004 J=2,KK
ISN 0059     1004 SUM=SUM&TP(J,I)
ISN 0060          TMA=SUM/FLOAT(N)
ISN 0061          ALF=PZ(N)*(RS&RU)
ISN 0062          BET=PZ(N)
ISN 0063          COST=DATA(2500)
ISN 0064          CALL GAPIZ (TMA,TPG,ALF,BET,RGAP,COST)
ISN 0065          GO TO 102
ISN 0066     1010 IF(DATA(2516).GT.1.0E-07)GO TO 3
ISN 0068      101 CALL GAP(TMU(I),TP(N,I),TP(NP2,I),RGAP)
ISN 0069      102 CONTINUE
ISN 0070          VL(N)=1.0/(RU&0.5*RGAP)
ISN 0071          VL(NP1)=1.0/(0.5*RGAP&RS)
ISN 0072          DO 5 K=N,NP1
ISN 0073          AI(K)=VL(K-1)
ISN 0074          CI(K)=VL(K)
ISN 0075        5 BI(K)=-(AI(K)&CI(K)&DI(K))
ISN 0076          AI(NP2)=VL(NP1)
ISN 0077          BI(NP2)=-(AI(NP2)&CI(NP2)&DI(NP2))
ISN 0078        2 IF(DATA(2518).GT.1.0E-07)GO TO 4
ISN 0080        3 CALL HTC(TP(NP3,I))
ISN 0081      105 CONTINUE
ISN 0082          RR=1.0/VLT
ISN 0083          VL(NP2)=1.0/(RS&RR)
ISN 0084          CI(NP2)=VL(NP2)
ISN 0085          BI(NP2)=-(AI(NP2)&CI(NP2)&DI(NP2))
ISN 0086          AI(NP3)=VL(NP2)
ISN 0087          BI(NP3)=-(AI(NP3)&G&DI(NP3))
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```
ISN 0088        4 B(1)=BI(1)
ISN 0089          CA(1)=CI(1)
ISN 0090          DO 18 K=2,NP2
ISN 0091          A(K)=AI(K)
ISN 0092          B(K)=BI(K)
ISN 0093       18 CA(K)=CI(K)
ISN 0094          DO 72 K=1,N
ISN 0095       72 TN(K)=-DI(K)*TP(K,I)-POW(K,I)
ISN 0096          A(NP3)=AI(NP3)
ISN 0097          B(NP3)=BI(NP3)
ISN 0098          TN(NP1)=-DI(NP1)*TP(NP1,I)
ISN 0099          TN(NP2)=-DI(NP2)*TP(NP2,I)
ISN 0100          TN(NP3)=-G*TP(NP3,I-1)-DI(NP3)*TP(NP3,I)
             C    RISOLUZIONE SISTEMA
ISN 0101          DO 19 K=2,NP3
ISN 0102          B(K)=B(K)-A(K)*CA(K-1)/B(K-1)
ISN 0103       19 TN(K)=TN(K)-A(K)*TN(K-1)/B(K-1)
ISN 0104          TP(NP3,I)=TN(NP3)/B(NP3)
ISN 0105          DO 20 K=1,NP2
ISN 0106          K1=NP3-K
ISN 0107       20 TP(K1,I)=TN(K1)/B(K1)-TP(K1&1,I)*CA(K1)/B(K1)
ISN 0108       17 CONTINUE
ISN 0109          CALL INTEGR
ISN 0110          IF(FVI)31,31,80
ISN 0111       31 WRITE (6,21) T
ISN 0112       33 DO 36 I=1,NS
ISN 0113       36 WRITE (6,23) (TP(J,I),J=1,NP3)
ISN 0114       23 FORMAT (1H0,10F10.3)
ISN 0115       21 FORMAT (1H0///5X,3HT =F8.3//)
ISN 0116          RETURN
ISN 0117       80 CONTINUE
ISN 0118          DO 81 I=1,NS
ISN 0119          DITMU(I)=TMU(I&1)-TMUI(I&1)
ISN 0120       81 DITCO(I)=0.5*(TP(NP3,I&1)&TP(NP3,I)-TCI(I&1)-TCI(I))
ISN 0121          RETURN
ISN 0122          END
```

COMPILER OPTIONS - NAME= MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

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              C
ISN 0002            SUBROUTINE VINIZ
ISN 0003            REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004            COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005            COMMON/CDATA/DATA(3500)
ISN 0006            COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                   1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                   2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007            COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SFI(12),SA(1
                   12),SPR(12),C(10,100),                     P1S(100),P2S(100),SOR(12),SOR
                   2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                   3VOLT,AL2(100),AB2(100),                       DLD,DER1(100),DER2(100),C
                   4DC(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
                   5L2(100),DLM,DEM1(100),DEM2(100)                ,EP1(100),BI1(100),BI2(
                   6100),              INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                   70),NRIT,SBETA,IDST,ST,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
                   8              AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
                   9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                   A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                   BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                   C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                   DI(100),SFI1(100),             COCI(10,100)
ISN 0008            GO TO (1,2,3,4,10),INTE
ISN 0009          1 IF(DATA(2521)-0.0001)11,11,12
ISN 0010         11 INTE=4
ISN 0011            GO TO 4
ISN 0012         12 TPI=DATA(2521)
ISN 0013            INTE=2
ISN 0014            GO TO 10
ISN 0015          2 TPI=TPI&DATA(2522)
ISN 0016            TPII=TPI
ISN 0017            INTE=3
ISN 0018            IF(DATA(2523).EQ.0.0)INTE=5
ISN 0019          3 TPI=TPII&TO*DATA(2523)
ISN 0020            GO TO 10
ISN 0021          4 DO 5 I=1,20
ISN 0022            TOAV=DATA(I&2901)
ISN 0023            IF(TO-TOAV)6,7,5
ISN 0024          6 TRAV=DATA(I&2801)
ISN 0025            TRDI=DATA(I&2800)
ISN 0026            TODI=DATA(I&2900)
ISN 0027            TPI=TRDI&(TO-TODI)*(TRAV-TRDI)/(TOAV-TODI)
ISN 0028            GO TO 8
ISN 0029          7 TPI=DATA(I&2801)
ISN 0030            GO TO 8
ISN 0031          5 CONTINUE
ISN 0032            TPI=TRAV
ISN 0033            INTE=5
ISN 0034          8 CONTINUE
ISN 0035
```

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ISN 0036      10 GO TO (21,22,23,24,20),INTER
ISN 0037      21 IF(DATA(2524)-1.0E-06)30,30,40
ISN 0038      30 INTER=4
ISN 0039         GO TO 24
ISN 0040      40 WS=DATA(2524)
ISN 0041         INTER=2
ISN 0042         GO TO 20
ISN 0043      22 WS=WS&DATA(2525)
ISN 0044         WSI=WS
ISN 0045         INTER=3
ISN 0046         IF(DATA(2526).EQ.0.0) INTER=5
ISN 0048      23 WS=WSI&TO*DATA(2526)
ISN 0049         GO TO 20
ISN 0050      24 DO 15 I=1,20
ISN 0051         TOAV=DATA(I&3101)
ISN 0052         IF(TO-TOAV)16,17,15
ISN 0053      16 VAV=DATA(I&3001)
ISN 0054         VDI=DATA(I&3000)
ISN 0055         TODI=DATA(I&3100)
ISN 0056         WS=VDI&(TO-TODI)*(VAV-VDI)/(TOAV-TODI)
ISN 0057         GO TO 20
ISN 0058      17 WS=DATA(I&3001)
ISN 0059         GO TO 20
ISN 0060      15 CONTINUE
ISN 0061         WS=VAV
ISN 0062         INTER=5
ISN 0063      20 CONTINUE
ISN 0064         RETURN
ISN 0065         END
```

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               C
ISN 0002             SUBROUTINE INTEGR
ISN 0003             REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004             COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005             COMMON/CDATA/DATA(3500)
ISN 0006             COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                    1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                    2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007             COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SF1(12),SA(1
                    12),SPR(12),C(10,100),                  P1S(100),P2S(100),SOR(12),SOR
                    2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                    3VOLT,AL2(100),AB2(100),                       DLD,DER1(100),DER2(100),C
                    4OC(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
                    5L2(100),DLM,DEM1(100),DEM2(100)            ,EP1(100),BI1(100),BI2(
                    6100),            INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                    70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,L1,SP1,REP,SPCR,
                    8                  AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
                    9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                    A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                    BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                    C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                    DI(100),SFI1(100),              COC1(10,100)
ISN 0008             JJ=ICAN
ISN 0009             NSM1=NS-1
ISN 0010             FNSV=FLOAT(NSM1)
ISN 0011             GO TO (10,20),JJ
ISN 0012          10 TMUR=0
ISN 0013             DO 2 I=2,NS
ISN 0014             SUMTP=TP(1,I)*R(1)*R(1)
ISN 0015             DO 1 J=2,N
ISN 0016           1 SUMTP=SUMTP&TP(J,I)*(2.0*R(J-1)&DR(J))*DR(J)
ISN 0017             TMU(I)=SUMTP/(R(N)*R(N))
ISN 0018           2 TMUR=TMUR&TMU(I)
ISN 0019             TMED(1)=TMUR/FNSV
ISN 0020             GO TO 30
ISN 0021          20 TMUR=0.0
ISN 0022             DO 7 I=2,NS
ISN 0023             SUMTP=0.0
ISN 0024             DO 8 J=1,N
ISN 0025           8 SUMTP=SUMTP&TP(J,I)*DR(J)
ISN 0026             TMU(I)=SUMTP/R(N)
ISN 0027           7 TMUR=TMUR&TMU(I)
ISN 0028             TMED(1)=TMUR/FNSV
ISN 0029          30 TM2=0.0
ISN 0030             DO 3 I=2,NS
ISN 0031           3 TM2=TM2&TP(NP1,I)
ISN 0032             TMED(2)=TM2/FNSV
ISN 0033             TM3=0
ISN 0034             DO 4 I=2,NS
```

```
ISN 0035        4 TM3=TM3&TP(NP2,I)
ISN 0036          TMED(3)=TM3/FNSV
ISN 0037          TM4=0.5*(TP(NP3,1)&TP(NP3,NS))
ISN 0038          DO 5 I=2,NSM1
ISN 0039        5 TM4=TM4&TP(NP3,I)
ISN 0040          TMED(4)=TM4/FNSV
ISN 0041          RETURN
ISN 0042          END
```

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              C
ISN 0002            SUBROUTINE HTC(TPCO)
ISN 0003            COMMON/CDATA/DATA(3500)
ISN 0004            COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                   1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                   2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0005            EQUIVALENCE(A1,DATA(3481))
ISN 0006            EQUIVALENCE(A2,DATA(3482))
ISN 0007            EQUIVALENCE(A3,DATA(3483))
ISN 0008            EQUIVALENCE(A4,DATA(3484))
ISN 0009            EQUIVALENCE(A5,DATA(3485))
ISN 0010            EQUIVALENCE(A6,DATA(3486))
ISN 0011            EQUIVALENCE(A7,DATA(3487))
ISN 0012            EQUIVALENCE(A8,DATA(3488))
ISN 0013            EQUIVALENCE(A9,DATA(3489))
ISN 0014            EQUIVALENCE(A10,DATA(3490))
ISN 0015            EQUIVALENCE(A11,DATA(3491))
ISN 0016            EQUIVALENCE(A12,DATA(3492))
ISN 0017            EQUIVALENCE (DIAH,DATA(3497))
ISN 0018            EQUIVALENCE(A18,DATA(3498))
ISN 0019            EQUIVALENCE(A19,DATA(3499))
ISN 0020            EQUIVALENCE(A20,DATA(3500))
ISN 0021          2 TINV1=1.0/TPCO
ISN 0022            TINV2=TINV1*TINV1
ISN 0023            TINV3=TINV1*TINV2
ISN 0024            ROCO=A1&A2*TINV1&A3*TINV2&A4*TINV3
ISN 0025            CSCO=A5&A6*TPCO
ISN 0026            VISCO=A7&A8*TINV1&A9*TINV2&A10*TINV3
ISN 0027            CONCO=A11&A12*TPCO
ISN 0028            PRANDT=VISCO*CSCO/CONCO
ISN 0029            REYN=ROCO*DIAH*WS/VISCO
ISN 0030            VLT=A18*CONCO*REYN**A19*PRANDT**A20/DIAH
ISN 0031            RETURN
ISN 0032            END
```

COMPILER OPTIONS - NAME=   MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
           C
ISN 0002           SUBROUTINE AZER
ISN 0003           COMMON/COMN/B(5774)
ISN 0004           COMMON/COMT/A(2578)
ISN 0005           DO 1J=1,2578
ISN 0006        1  A(J)=0.0
ISN 0007           DO2 J=1,5774
ISN 0008        2  B(J)=0.0
ISN 0009           RETURN
ISN 0010           END
```

COMPILER OPTIONS - NAME= MAIN,OPT=00,LINECNT=50,SOURCE,BCD,NOLIST,DECK,LOAD,MAP,NOEDIT,NOID

```
          C
ISN 0002          SUBROUTINE GAPIZ(TMA,TPG,ALF,BET,RGAP,COST)
ISN 0003          COMMON/CDATA/DATA(3500)
ISN 0004          AFUNF(RGAP)=9.7*COST*(AA&BB*RGAP)*(ALF&BET*RGAP)/((ALF&BET*RGAP&TA
         1G)**1.65-TT)-RGAP
ISN 0005          BFUNF(RGAP)=9.7*COST*5.C*(ALF&BET*RGAP)/((ALF&BET*RGAP&TAG)**1.65
         1-TT)-RGAP
ISN 0006          TAG=TPG&273.0
ISN 0007          AA=-58.0&0.165*TAG-0.148*(TMA&ALF)
ISN 0008          BB=-0.148*BET
ISN 0009          TT=TAG**1.65
ISN 0010          IF(AA-5.0)8,8,18
ISN 0011       18 RGAP=(5.0-AA)/BB
ISN 0012          X=AFUNF(RGAP)
ISN 0013          IF(X)19,4,8
ISN 0014       19 XV=X
ISN 0015          RV=0.0
ISN 0016        7 RV1=RGAP
ISN 0017          RGAP=0.5*(RGAP&RV)
ISN 0018          X=AFUNF(RGAP)
ISN 0019          IF(ABS(X/RGAP)-0.001)4,3,3
ISN 0020        3 SIGN=X*XV
ISN 0021          XV=X
ISN 0022          IF(SIGN)5,5,7
ISN 0023        5 RV=RV1
ISN 0024          GO TO 7
ISN 0025        4 GIO=AA&BB*RGAP
ISN 0026          GO TO 9
ISN 0027        8 GIO=5.0
ISN 0028          RV=0.0
ISN 0029          XV=-1.0
ISN 0030          RGAP=0.01
ISN 0031      111 X=BFUNF(RGAP)
ISN 0032          IF(X)12,9,11
ISN 0033       11 RV=RGAP
ISN 0034          RGAP=2.0*RGAP
ISN 0035          GO TO 111
ISN 0036       12 RV1=RGAP
ISN 0037          RGAP=0.5*(RGAP&RV)
ISN 0038          X=BFUNF(RGAP)
ISN 0039          IF(ABS(X/RGAP)-0.001)9,13,13
ISN 0040       13 SIGN=X*XV
ISN 0041          XV=X
ISN 0042          IF(SIGN)15,9,12
ISN 0043       15 RV=RV1
ISN 0044          GO TO 12
ISN 0045        9 WRITE (6,10) GIO,RGAP
ISN 0046       10 FORMAT (1H0/,5X,6H GIO =E12.5,5X,7H RGAP =E12.5)
ISN 0047          RETURN
ISN 0048          END
```

```
                  C
ISN 0002                SUBROUTINE GAP(TPUR,TPS,TPG,RGAP)
ISN 0003                COMMON/CDATA/DATA(3500)
ISN 0004                GIO=-58.0&0.313*(TPG&273.0)-0.148*(TPUR&273.0)
ISN 0005                IF(GIO-5.0)1,2,2
ISN 0006              1 GIO=5.0
ISN 0007              2 RGAP=9.7*GIO*(TPS-TPG)/((TPS&273.0)**1.65-(TPG&273.0)**1.65)*
                       1DATA(2500)
ISN 0008                RETURN
ISN 0009                END
```

```
           C      TEST
ISN 0002          SUBROUTINE TEST
ISN 0003          REAL*8 PM1,PM2,PMPT,P1,P2,TN1,TN2
ISN 0004          COMMON/DP/PMPT,PM1,PM2,P1(100),P2(100),TN1(100),TN2(100)
ISN 0005          COMMON/CDATA/DATA(3500)
ISN 0006          COMMON/COMT/ITIPO,N,NS,NP1,NP2,NP3,TP(10,100),TMED(4),VL(10),SC(10
                 1),RO(10),DR(10),DX,VLR,RS,R(10),RU,TMU(100),TPI,WS,VLT
                 2,TMUI(100),TCI(100),DITMU(100),DITCO(100),DT,POW(10,100),PFAC(10)
ISN 0007          COMMON/COMN/KBA,KTE,KBAR,KS,NREG,D1(12),D2(12),SR(12),SF1(12),SA(1
                 12),SPR(12),C(10,100),                  P1S(100),P2S(100),SOR(12),SOR
                 2M(100),IMAX,DLDT(10),DL(10),BETA(10),DETA(10),DELT,IM1,NK,BE(100),
                 3VOLT,AL2(100),AB2(100),                 DLD,DER1(100),DER2(100),C
                 4OC(10,100),IT,TO,KBI,VBAR,EPN,I1(12),I2(12),W(12),V(12),AL1(100),B
                 5L2(100),DLM,DEM1(100),DEM2(100)          ,EP1(100),BI1(100),BI2(
                 6100),            INTER,EPS,INTE,PER,PINT,P(12),BU,BE1(100),BE2(10
                 70),NRIT,SBETA,IDST,SI,ITCR,KV(12),SPRG,DAPF,LF,LI,SP1,REP,SPCR,
                 8             AL22(100),DINS,SPRCU(12),SPRCO(12),SPRMO(12),
                 9PCU(12),PCO(12),PMO(12),SFCU(12),SFCO(12),SFMO(12),SRCU(12),SRCO(1
                 A2),SRMO(12),D1CU(12),D1CO(12),D1MO(12),D2CU(12),D2CO(12),D2MO(12),
                 BWCU(12),WCO(12),WMO(12),VCU(12),VCO(12),VMO(12),SF1CU(12),SF1CO(12
                 C),SF1MO(12),IDIR,SPB,ICAN,POWER,DZ,DZ2,EP2(100),BL1(100),SF(12),SF
                 DI(100),SFI1(100),              COCI(10,100)
ISN 0008          KTE=0
ISN 0009          RETURN
ISN 0010          END
```

COSTANZA ASSIALE

TEST COSTANZA AXIAL 1

```
   1  0.100000E-02     2  0.100000E 02     3  0.210000E 02     4  0.200000E 01     5  0.0                    6  0.500000E 02
   7  0.100000E 01     8  0.100000E 01     9  0.100000E 01    10  0.0              11  0.100000E-03         12  0.0
  61  0.100000E 01    62  0.110000E 02    63  0.210000E 02
  81  0.100000E 01    82  0.100000E-01    83  0.900000E 00    84  0.100000E-03    85  0.100000E 08         86  0.0
  87  0.100000E 01    88  0.100000E-01    89  0.0             90  0.150000E-01    91  0.250000E 06         92  0.0
  93  0.100000E 01    94  0.100000E-01    95  0.900000E 00    96  0.100000E-03    97  0.100000E 08         98  0.0
  99  0.100000E 01   100  0.100000E-01   101  0.300000E-02   102  0.150000E-01   103  0.250000E 06        104  0.0
1611  0.100000E 03  1612  0.100000E-03  1613  0.200000E 03  1614  0.300000E-02
1621  0.100000E-01  1622  0.110000E-01
1701  0.0           1702 -0.100000E-03
1781  0.100000E 01
1851  0.100000E 03  1852  0.100000E 02  1853  0.300000E 01  1854  0.100000E 03  1855  0.200000E 01  1856  0.0
```

DELT = 0.10000E-03   TO =   0.0   IT =   0   IMAX =   21   NREG =   2

NRIT =   0   INTE =   0   IDST =   50   ITCR =   1

INDICI INTERFACCE

```
        1           11          21
1   0.10000E 01   0.10000E-01   0.90000E 00   0.10000E-03   0.10000E 08   0.0
1   0.10000E 01   0.10000E-01   0.0           0.15000E-01   0.25000E 06
2   0.10000E 01   0.10000E-01   0.90000E 00   0.10000E-03   0.10000E 08   0.0
2   0.10000E 01   0.10000E-01   0.30000E-02   0.15000E-01   0.25000E 06
```

RICERCA CRITICITA

BARRE A BANCO -SEZIONE DI VELENO 0.3000E-02

SPRG =   0.10000E 03   DAPF =   0.10000E-03   LF = 200   ITCR =   1

ITERAZIONI	PM2	REP	VELENO
13	0.11060D 01	0.23507E-04	0.10408E 03

TO =   0.0   IT =   0   PER = 0.43550E C5   PINT = 0.0   INT = 1

	P1	P2	VELENO
1	0.0	0.0	0.30000E-02
2	0.37170D 00	0.25206D 00	0.30000E-02
3	C.73329D 00	0.49726D 00	0.30000E-02
4	0.10749D 01	0.72895D 00	0.30000E-02
5	0.13874D 01	C.94C81D 00	0.30000E-02
6	0.16621D 01	0.11271D 01	0.30000E-02
7	0.18917D 01	C.12827D 01	0.30000E-02
8	0.20699D 01	C.14033D 01	0.30000E-02
9	0.21924D 01	0.14853D 01	0.30000E-02
10	0.22576D 01	0.15249D 01	0.30000E-02
11	0.22702D 01	0.15152D 01	0.21125E-02
12	0.22576D 01	0.15249D 01	0.0
13	0.21924D 01	0.14853D 01	0.0
14	0.20699C 01	0.14C33D 01	0.0
15	0.18916D 01	C.12827D 01	0.0
16	0.16621D 01	0.11271D 01	0.0
17	C.13874D 01	C.94080D 00	0.0
18	0.10749D 01	0.72894D 00	0.0
19	0.73328D 00	0.49726D 00	0.0
20	0.3717CD 00	0.25206D 00	0.0
21	0.0	0.0	0.0
MEDIE	0.14776D 01	0.10000D 01	

TO =   C.10000   PM1 = 0.45364D 01   PM2 = 0.307C5D 01   PER = 0.80178E-01
FLM1
     0.4651E C1   0.4422E 01
FLM2
     0.3154E C1   0.2587E 01

TO =   0.10000   IT =   100   PER = 0.80178E-01   PINT = 0.17710E 00   INT = 1

            P1   P2   VELENO

    1   C.0   0.0   C.30000E-02
    2   0.11916D 01   0.80984D 00   C.29000E-02
    3   0.23483D 01   0.15959D 01   C.29000E-02
    4   0.34361D 01   C.23353D 01   0.29000E-02
    5   0.44233D 01   C.30062D 01   C.29000E-02
    6   C.52809D 01   0.35889D 01   C.29000E-02
    7   C.59837D 01   0.4C664D 01   C.2900CE-02
    8   0.65117C 01   0.44242D 01   C.29000E-02
    9   0.68507D 01   0.46508D 01   C.290C0E-02
   10   0.69966D 01   0.47343D 01   C.29000E-02
   11   0.69686D 01   0.46515D 01   0.20625E-02
   12   0.68631D 01   0.46286D 01   0.0
   13   0.66099D 01   C.44692D 01   0.0
   14   0.61974D 01   C.41930D 01   0.0
   15   0.56317C 01   0.38109D 01   0.0
   16   0.49257C 01   0.33333D 01   0.0
   17   0.40968C 01   0.27724D 01   0.0
   18   C.31656C 01   0.21422D 01   0.0
   19   C.21553C 01   0.14586D 01   0.0
   20   0.10913D 01   C.73851D 00   0.0
   21   0.0   0.0   0.0

MEDIE   0.45364D C1   C.307C5D 01

PRINT N. 3

PRINT N. 2

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COSTANZA ASSIALE

TEST 2

```
   8  0.0
  12  0.100000E 01      13  0.300C00E 06   14  0.100000E 02   15  0.500000E 01   16  0.100000E 01
1601  0.100000E 01
1611  C.200C0CE-C2
1620 -C.100000E-C3
17C2  0.100000E C3
2501  0.0           25C2  0.400000E 01 2503  0.160000E 01 2504  0.100000E-01 2505  0.750000E-01 2506  0.240000E 00
2507  0.130000E 02 2508  0.100000E-02 2509  0.270000E 01 2510  0.100000E 01 2511  0.150000E 00 2512  0.500000E 01
2513  0.100000E 01 2514  0.100000E 01 2515  0.200000E 00 2516  0.200000E-01 2517  0.200000E 01 2518  0.166000E 01
2519  0.0           2520  0.0           2521  0.200000E 03 2522  0.0           2523  0.0           2524  0.100000E 04

DELT = 0.10000E-03    TU =     0.0        IT =    0    IMAX =    21    NREG =    2

NRIT =    0    INTE =    C    IDST =   50    ITCR =    1
```

INDICI INTERFACCE

```
     1           11          21
 1   0.10000E C1  C.10000E-01  0.90000E 00  0.10000E-03  0.10000E 08  0.0
 1   0.10000E 01  0.10000E-01  0.0          0.15000E-01  0.25000E 06
 2   0.10000E 01  0.10000E-01  0.90000E 00  0.10000E-03  0.10000E 08  0.0
 2   0.10000E 01  0.10000E-01  0.30000E-02  0.15000E-01  0.25000E 06
```

RICERCA CRITICITA

REGIONI AVVELENATE   1   0

SPRG = 0.20000E-02   DAPF = 0.10000E-03   LF = 200   ITCR = 1

ITERAZIONI	PM2	REP	VELENO
48	0.16457D 01	0.84248E-04	0.31218E-02

TO = 0.0   IT = 0   PER = 0.12230E 05   PINT = 0.0   INT = 1

	P1	P2	VELENO
1	0.0	0.0	0.0
2	0.34524D 00	0.23291D 00	0.0
3	0.68292D 00	0.46071D 00	0.0
4	0.10056D 01	0.67841D 00	0.0
5	0.13063D 01	0.88124D 00	0.0
6	0.15783D 01	0.10648D 01	0.0
7	0.18157D 01	0.12249D 01	0.0
8	0.20133D 01	0.13583D 01	0.0
9	0.21667D 01	0.14619D 01	0.0
10	0.22722D 01	0.15339D 01	0.0
11	0.23264D 01	0.15735D 01	0.0
12	0.23235D 01	0.15746D 01	0.0
13	0.22588D 01	0.15315D 01	0.0
14	0.21331D 01	0.14465D 01	0.0
15	0.19496D 01	0.13220D 01	0.0
16	0.17130D 01	0.11616D 01	0.0
17	0.14299D 01	0.96963D 00	0.0
18	0.11079D 01	0.75128D 00	0.0
19	0.75575D 00	0.51249D 00	0.0
20	0.38308D 00	0.25978D 00	0.0
21	0.0	0.0	0.0

MEDIE   0.14784D 01   0.10000D 01

CANALE TIPO 1   TO =   0.050

1	0.0	0.0	0.0	0.0	0.0	0.0	200.000
2	308.794	300.106	282.729	256.632	230.105	220.717	201.154
3	525.148	499.272	447.524	369.802	290.804	262.847	204.592
4	736.664	694.170	609.182	481.542	351.815	305.904	210.236
5	938.694	880.514	764.150	589.390	411.796	348.945	217.962
6	1126.801	1054.210	909.020	690.974	469.428	391.022	227.600
7	1296.852	1211.443	1040.611	784.059	523.446	431.214	238.938
8	1445.125	1348.766	1156.035	866.601	572.666	468.641	251.729
9	1568.394	1463.196	1252.781	936.803	616.017	502.489	265.690
10	1664.094	1552.345	1328.831	993.194	652.584	532.041	280.520
11	1730.690	1614.780	1382.944	1034.825	681.726	556.762	295.900
12	1764.702	1647.275	1412.408	1059.752	702.249	575.728	311.479
13	1760.368	1644.510	1412.780	1064.850	712.310	587.545	326.849
14	1715.754	1604.674	1382.504	1048.937	711.078	591.508	341.584
15	1632.622	1529.357	1322.815	1012.721	698.733	587.611	355.281
16	1513.364	1420.724	1235.434	957.253	675.645	575.983	367.568
17	1361.249	1281.754	1122.756	884.049	642.449	556.946	378.110
18	1180.417	1116.226	987.843	795.099	600.048	531.018	386.621
19	975.775	928.634	834.354	692.811	549.590	498.904	392.869
20	752.874	724.066	666.455	579.961	492.447	461.476	396.684
21	517.769	508.079	488.701	459.605	430.169	419.751	397.963

TO =   C.10000   PM1 = 0.42668D 01   PM2 = 0.28865D 01   PER = 0.84911E-01

FLM1
     0.4244E 01   0.4289E 01
FLM2
     0.2870E C1   0.2903E 01

PRINT N. 3

TC =   0.10000   IT =   10C   PER = 0.84911E-01   PINT = 0.17112E 00   INT =   5

	P1	P2	VELENO
1	0.0	0.0	-0.10000E-03
2	0.10409D 01	0.7C392D 00	-0.10000E-03
3	0.20566D 01	0.13906D 01	-0.10000E-03
4	C.30227D 01	0.20439D 01	-C.10000E-03
5	0.39157C 01	0.26477D 01	-0.10000E-03
6	0.47143D 01	0.31877D 01	-0.10000E-03
7	0.53989D 01	0.36506D 01	-0.10000E-03
8	0.59532D 01	0.4C254D 01	-0.10000E-03
9	0.63636C 01	0.43031D 01	-C.10000E-03
10	0.66202D 01	0.44769D 01	-C.10000E-03
11	0.67161D 01	0.45434D 01	-0.50000E-04
12	0.66466C 01	0.44980D 01	0.0
13	0.64112C 01	0.43390D 01	0.0
14	0.60150C 01	C.40710D 01	0.0
15	0.54680C 01	0.37C08D 01	0.0
16	0.47838C 01	0.32377D 01	0.0
17	0.39796D 01	0.26934D 01	0.0
18	0.30755D 01	0.2C915D 01	0.0
19	0.20942C 01	0.14174D 01	0.0
20	0.10604D 01	C.7177CD 00	0.0
21	0.0	0.0	0.0

MEDIE   0.42668D 01   0.28865D 01

PRINT N. 2
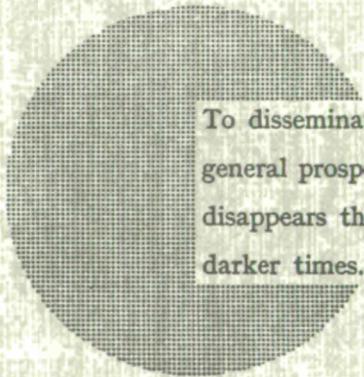
To disseminate knowledge is to disseminate prosperity — I mean general prosperity and not individual riches — and with prosperity disappears the greater part of the evil which is our heritage from darker times.

Alfred Nobel

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