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# NASA TECH BRIEF

## *Marshall Space Flight Center*



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### Synthesis of Dynamic Systems

#### The problem:

To devise an efficient method of solving small and medium size structural dynamics problems expressed in matrix form. To program only a specific type of problem, using a basic computer language, is too time consuming and expensive if the program is not going to be used extensively.

#### The solution:

A library of computer programs, called FORTRAN Matrix Analysis (FORMA), which can efficiently find solutions of small and medium size structural dynamics problems of up to 150 degrees of freedom.

#### How it's done:

The library consists of 86 subroutines that may be combined in the form of "building blocks" to solve a large variety of structural dynamics problems. The only programming and checkout time required is that needed for putting the appropriate blocks together in the proper order.

The FORMA library includes routines for beam mass matrix calculations, beam stiffness matrix calculations, eigenvalue vector solutions, time response solutions, and basic matrix algebra calculations. The advantageous features of the FORMA method include:

1. Adaptability: the method will work on any computer with a FORTRAN IV compiler. It has also been modified for use on the IBM 7044/7094/360, GE 625/635, CDC 6400/6500, and UNIVAC 1108 systems.

2. Reasonable computer times.
3. Easy incorporation of new subroutines.
4. Flexibility: Basic FORTRAN statements may be used in writing the programs.
5. Minimal training requirements: an analyst can program relatively complex problems with very little programming experience.
6. Correlation to mathematical formulation of the physical problem.
7. Reliability: the subroutines have been used extensively and are well checked out and debugged.

#### Notes:

1. This program is written in FORTRAN IV for use on the UNIVAC 1108. It is adaptable to any machine with a FORTRAN IV compiler.
2. Requests for further information may be directed to:

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#### Patent status:

No patent status is contemplated by NASA.

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