

NASA TECH BRIEF

Manned Spacecraft Center



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Program To Reduce The Size Of Structural Matrices

The problem:

To reduce large mass and stiffness matrices to a size that will fit within the region available in the modal analysis program.

The solution:

A computer program was developed to reduce both mass and stiffness matrices by eliminating degrees of freedom using the Cholesky decomposition.

How it's done:

The program performs a Guyan (consistent mass) reduction on any structural mass and stiffness matrices. This reduction allows calculation of eigenvalues of a smaller matrix that would otherwise be required. Assuming sufficient auxiliary storage (on tape, disk, or similar device), the matrix sizes that may be reduced are essentially limited only by the cost. Three double precision arrays and two integer arrays (each of the length of one row of the matrix) are required to be in core at any one time. Efficiency is greatly improved, however, if more core is provided since the program automatically

utilizes all available core. Accuracy is dependent upon the conditioning of the input matrices and the accuracy with which the input matrices were formulated.

Notes:

1. This program is written in FORTRAN G or H to be used on the IBM-360 computer.
2. Inquiries concerning this program should be directed to:

COSMIC
112 Barrow Hall
University of Georgia
Athens, Georgia 30601
Reference: MSC-17619

Source: Helen W. Spurlin and
Richard Heckenlaible of
North American Rockwell Corp.
under contract to
Manned Spacecraft Center
(MSC-17619)

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