July 1974

B74-10076

NASA TECH BRIEF

Marshall Space Flight Center

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Dynamic Transformation Method

The problem:

The eigenvalue problem associated with the modal-synthesis vibration analysis of complex structures requires simplifying assumptions for solution. The usual simplification, the omission of substructure vibration modes, introduces truncation errors.

The solution:

A computer program, Dynamic-transformation Adapted to Modal-synthesis Using Stiffness-coupling (DAMUS), has been developed. The program improves the computational economy for the vibration analysis of complex structures while still considering substructure modes.

How it's done:

A dynamic transformation is obtained from the partitioned equations of motion that relates substructure modes not explicitly defined in the condensed solution to the retained substructure modes at a selected system frequency. The generalized mass and stiffness matrices, which are obtained with existing modal-synthesis methods, are reduced, using the transformation, and are solved. Revised solutions are then obtained, using new transformations at the calculated eigenvalues, and are also used to assess the accuracy of the results. If all the modes of interest have not been obtained, the results are used to select a new set of retained substructure modes and a new transformation frequency; and the procedure is repeated for another group of modes. The method provides improved computational economy in the vibration analysis of complex structures.

Notes:

1. This program was written in FORTRAN V for use on a UNIVAC 1108 computer operating under EXEC II.
2. Inquiries concerning this program should be directed to:

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General Electric Co.
under contract to
Marshall Space Flight Center
(MFS-22848)

Category 09, 06

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