

NASA TECH BRIEF

Marshall Space Flight Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

Vibrational Transfer Functions for Base Excited Systems

The problem:

To compute the vibrational transfer functions for complex structures subjected to a specified base motion. In the design of a complex structure, the governing vibration environment is generally specified in terms of either a sinusoidal or random base.

The solution:

A computer program, GD203, which develops transfer functions for complex structures subjected to a base motion.

How it's done:

An analytical model of the structure is developed, and the analytical modal (natural frequencies and mode shapes) and modal properties are used in a response analysis to determine system transfer functions. The analytical model consists of mass and stiffness matrices generally developed for lumped parameter systems using finite element techniques. For complex structures, the total system modal properties are sometimes developed through modal coupling techniques.

The methodology and the computer program require external development of the system modal properties, but have the flexibility to utilize modal properties developed from modal coupling techniques. The program is also capable of plotting the computed transfer functions.

This program has been successfully utilized to predict the response of complex aerospace structures to specified random and sinusoidal base excitation. It has also been applied to the problem of determining payload response to a test level payload/booster interface environment.

Notes:

1. The program considers base excitation only.
2. This program is written in FORTRAN V for use on the CDC-6000 series computers.
3. Requests for further information may be directed to:

COSMIC
112 Barrow Hall
University of Georgia
Athens, Georgia 30601
Reference: B71-10441

Patent status:

No patent action is contemplated by NASA.

Source: P.J. Jones and C. Ernst of
Martin Marietta Corp.
under contract to
Marshall Space Flight Center
(MFS-21432)

Category 09