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NASA TECH BRIEF

Langley Research Center

Static Aeroelastic Program

The problem:

In the design of new aircraft, it may be required to calculate both rigid and elastic alpha-stability and q-stability derivatives as well as the induced drag for a thin elastic aeroplane at subsonic and supersonic speeds.

The solution:

A set of programs has been written which can be used to compute geometric, mass, aerodynamic, and structural effects on fighter and transport type aircraft.

How it's done:

The program represents the airplane at subsonic and supersonic speeds as a thin surface or surfaces (without dihedral) composed of discrete panels of constant pressure for the aerodynamic effects and as a slender beam or beams for the structural effects. Given a set of input data, the program calculates an aerodynamic-influence coefficient matrix and a structural-influence coefficient matrix. Longitudinal stability derivatives for rigid airplanes are calculated from the aerodynamic-influence coefficient matrix, and both matrices are used to calculate the stability derivatives for elastic airplanes. Using the aerodynamic finite-element method, the program can also be used to compute the rate of the sectional induced-drag coefficient to the square of the total-lift coefficient for rigid and elastic wings. The program is compatible with the geometric requirements and definitions of previous programs which employ "wave drag" input data.

Notes:

1. This program was written in CDC FORTRAN Version 2.3 to run on a CDC 6000 Series Computer with the SCOPE 3.0 Base Operating System and Library Tape.
2. Inquiries concerning the program should be directed to:

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