NASA TECH BRIEF

Computer Program Performs Rectangular Fitting Stress Analysis

A computer program has been designed to simulate specific bulkhead fittings by subjecting the desired geometry configuration to a membrane force, an external force, an external moment, an internal tank pressure, or any combination of the above. Forces and moments resulting from the above loads are considered as well as forces and moments imposed by geometry deformations.

This program generates a general model of bulkhead fittings for the Saturn Boosters. The fitting is free-bodied at each point of discontinuity and is composed of the following segments: (1) the booster bulkhead on which the fitting is welded, (2) outer annular ring or interstep between the bulkhead and the thickest part of the fitting, (3) inner annular ring, (4) ring boss which serves as a rigid mount for line flanges, and (5) an internal or external cylinder bolted to the ring.

The theory of strain compatibility is utilized in writing the discontinuity equations, which represent relations between deflections and rotations of adjacent components of the fitting. The solutions to these equations are found by P. D. Crout's elimination method for solutions of linear simultaneous equations. The solutions are used to compute stresses and margins of safety for various components of the fitting.

Notes:

1. The program is written in Fortran II language for the IBM 7094 computer.
2. The program should have wide uses in the aerospace industry and other industries engaged in the manufacture of tanks, and other similar equipment, where bulkhead fittings are present.
3. Inquiries concerning this program may be addressed to:

   COSMIC
   Computer Center
   University of Georgia
   Athens, Georgia 30601
   Reference: B67-10520

Patent status:

No patent action is contemplated by NASA.

Source: A. R. Bertrand
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