AEC-NASA TECH BRIEF

General Series Solution Technique for Bending of Irregular Laterally Loaded Flat Plates

A computer program has been developed to calculate the stresses and lateral deflections to a uniform thickness flat plate with a uniform pressure load. The plate to be analyzed may have several different types of boundary conditions. The method handles plates of irregular geometry, for which analytic solutions are not available.

The computer program determines the best coefficients for a truncated series solution for the deflection of the flat plate under a lateral load. These coefficients are obtained by a least-squares fit to the boundary conditions at a finite number of boundary points. The accuracy of the solution depends on the number of terms used from the series. The program limits the number of series terms to 140 and the number of boundary points to 300.

At each boundary point two boundary conditions are selected. The allowed boundary conditions are: specified deflection, specified slope, specified moment, specified shear force, or a free straight edge. From these conditions the usual cases of fixed edges, simply supported edges, free straight edges, and lines of symmetry can be obtained.

After the best coefficients for the series solution are obtained, the deflections, shapes, and stresses can be calculated for any point on the plate.

Notes:

1. The program is written in Fortran IV for use on the CDC 6600 computer.
2. A polar series solution cannot be guaranteed to converge for an arbitrary geometry. However, this program has given excellent results for a wide range of geometries.
3. Inquiries concerning this program may be made to:
   COSMIC
   Computer Center
   University of Georgia
   Athens, Georgia 30601
   Reference: B69-10035

Patent status:

No patent action is contemplated by AEC or NASA.

Source: John A. Swanson
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