NASA TECH BRIEF
Lewis Research Center

Computer Program for Calculating Critical Speeds of Rotating Shafts

A computer program has been written to calculate the critical speeds of rotating shafts. The shaft may include bearings, couplings, extra masses (nonshaft mass), and disks for the gyroscopic effect. Shear deflection is also taken into account and provision is made in the program for sections of the shaft that are tapered. The boundary conditions at the ends of the shaft can be fixed (deflection and slope equal zero) or free (shear and moment equal zero). The fixed end condition enables the program to calculate the natural frequencies of cantilever beams. Instead of using the lumped-parameter method, the program uses continuous integration of the differential equations of beam flexure across different shaft sections. The advantages of this method over the usual lumped-parameter method are less data preparation and better approximation of the distribution of the mass of the shaft.

A main feature of the program is in the nature of the output. A plotter is used to produce a drawing of the shaft with superimposed deflection curves at the critical speeds together with all pertinent information related to the shaft.

Notes:
1. The program is written in FORTRAN IV for the IBM DCS 7094/7044 computer.
2. Inquiries concerning the program should be directed to:

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