

# NASA TECH BRIEF

## *Lewis Research 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.

### Evaluation of Rotating, Incompressibly Lubricated, Pressurized Thrust Bearings

#### **The problem:**

To analyze the operation of an orifice-compensated (or capillary-compensated) thrust bearing, including the rotational effects and the effects of any adjoining journal bearings. Since the speed sharing between the fluid-film and the ball bearings depends on the torque characteristics of the two component bearings, the fluid-film bearing must be properly sized in order to obtain a useful reduction in ball bearing speed and provide adequate load capacity.

There appears to be no published information on rotating, compensated, pressurized thrust bearings using incompressible lubricants.

#### **The solution:**

An analytical method and a computer program which enable the rapid evaluation of pressurized thrust bearings which use an incompressible lubricant.

#### **How it's done:**

The program was used to evaluate a series-hybrid, fluid-film ball bearing consisting of an orifice compensated pressurized thrust bearing in conjunction with a self-acting journal bearing. Oil viscosities corresponding to experimentally measured ball bearing outer-race temperatures were used in the computer program. Points for the analytical curve were obtained from plots of measured bearing

torque. The analysis indicated that, when the supply pressure became high enough to lift off the fluid-film thrust bearing, the intermediate speed dropped abruptly. After lift off, the intermediate speed would rise at a slightly lower rate than the shaft speed. Results of the computer program agree well with the experimental data.

#### **Notes:**

1. This program is written in FORTRAN IV for use on the IBM-7094 computer, and may be used with any computer that has a FORTRAN IV compiler.
2. The program has the capability to handle input and output in either U.S. customary or metric (SI) units.
3. Requests for further information may be directed to:

COSMIC  
112 Barrow Hall  
University of Georgia  
Athens, Georgia 30601  
Reference: B71-10509

#### **Patent status:**

No patent action is contemplated by NASA.

Source: D.P. Fleming  
Lewis Research Center  
(LEW-11511)

Category 09