

COMPUTER AIDED DESIGN OF HYDRODYNAMIC OIL JOURNAL BEARINGS INCLUDING THERMAL EFFECTS

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The lecture will highlight the design procedure of hydrodynamic oil journal bearings considering the variation of temperature of the lubricant film in the bearing/journal surface. The classical theory of hydrodynamic lubrication neglects the effect of variation of viscosity of lubricant with temperature.

To consider this aspect the Reynolds equation is solved simultaneously with energy equation and heat conduction equations in the journal and bush surfaces to determine pressure distribution in the film. The load carrying capacity, flow requirement and coefficient of viscous friction are then calculated. Empirical relations based on numerical solution are provided for design of such bearings.

As whirl instability is one of serious problems in high speed bearings, linear and nonlinear stability analyses are also performed to check threshold speed of the bearings designed using steady state analysis.