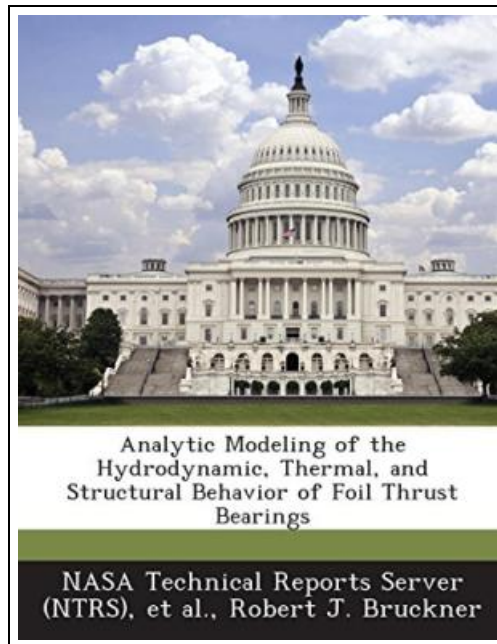


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Bibliogov, United States, 2013. Paperback. Condition: New. Language: English . Brand New Book ***** Print on Demand *****.A simulation and modeling effort is conducted on gas foil thrust bearings. A foil bearing is a self acting hydrodynamic device capable of separating stationary and rotating components of rotating machinery by a film of air or other gaseous lubricant. Although simple in appearance these bearings have proven to be complicated devices in analysis. They are sensitive to fluid structure interaction, use a compressible gas as a lubricant, may not be in the fully continuum range of fluid mechanics, and operate in the range where viscous heat generation is significant. These factors provide a challenge to the simulation and modeling task. The Reynolds equation with the addition of Knudsen number effects due to thin film thicknesses is used to simulate the hydrodynamics. The energy equation is manipulated to simulate the temperature field of the lubricant film and combined with the ideal gas relationship, provides density field input to the Reynolds equation. Heat transfer between the lubricant and the surroundings is also modeled. The structural deformations of the bearing are modeled with a single partial differential equation. The equation models the top foil as a thin, bending dominated membrane whose deflections are governed by the biharmonic equation. A linear superposition of hydrodynamic load and compliant foundation reaction is included. The stiffness of the compliant foundation is modeled as a distributed stiffness that supports the top foil. The system of governing equations is solved numerically by a computer program written in the Mathematica computing environment. Representative calculations and comparisons with experimental results are included for a generation I gas foil thrust bearing.



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