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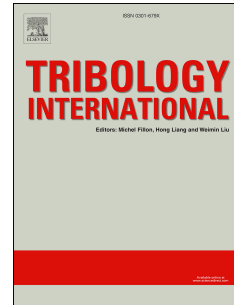
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Real-gas effects on aerodynamic bearings

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Abstract

Motivated by the use of aerodynamic bearings lubricated with high-pressure gases in energy conversion cycles, the Reynolds equation is adapted in order to include effects of real-gas and turbulence. Three geometries (Rayleigh-step slider, plain and herringbone-grooved journal bearing) serve to investigate real-gas effects on the static and dynamic properties with a wide variety of lubricants and nondimensional operating conditions. Computational results show a depreciation of the load capacity of journal bearings, with cases reaching a reduction of 50% with unequally affected force components. Stability can be affected both positively and negatively. Some stability losses reach nearly 100%, while improvements of several orders of magnitude with the grooved bearing are reported. Results are fluid-independent for similar reduced pressure and temperature.

Keywords: Aerodynamic Lubrication, Gas Bearings, Real Gas, Simulation

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