A Note on Rough Porous Slider Bearings Lubricated with Couple Stress Fluid

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A B S T R A C T

The analysis of hydrodynamic lubrication of rough porous slider-bearings with couple stress fluid is studied in this paper. Different types of film shapes were studied in this paper, including plane slider bearing, exponential bearing, secant shape bearing, and hyperbolic shaped bearing. The generalized average Reynolds-type equation is derived for the rough porous slider bearing lubricated with Stokes couple stress fluid. We solve the stochastic Reynolds equation and obtain closed-form expressions for pressure, load carrying capacity, frictional force, and center of pressure. The results are computed numerically for various film shapes under consideration. For all the lubricant film shapes considered, the negatively skewed surface roughness is observed to increase the load carrying capacity, frictional force, and temperature rise while reducing the coefficient of friction. On the contrary, the reverse trend is observed for positively skewed surface roughness.

Keywords: Slider bearings, Couple stress fluids, Surface roughness, Porous.

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