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Numerical Simulation of the Kurtosis Effect on the EHL Problem

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Abstract : In this study, a computational fluid dynamics (CFD) model has been developed for studying the effect of surface roughness profile on the EHL problem. The cylinders contact geometry, meshing and calculation of the conservation of mass and momentum equations are carried out by using the commercial software packages ICEMCFD and ANSYS Fluent. The user defined functions (UDFs) for density, viscosity and elastic deformation of the cylinders as the functions of pressure and temperature have been defined for the CFD model. Three different surface roughness profiles are created and incorporated into the CFD model. It is found that the developed CFD model can predict the characteristics of fluid flow and heat transfer in the EHL problem, including the leading parameters such as the pressure distribution, minimal film thickness, viscosity, and density changes. The obtained results show that the pressure profile at the center of the contact area directly relates to the roughness amplitude. The rough surface with kurtosis value over 3 influences the fluctuated shape of pressure distribution higher than other cases.

Keywords : CFD, EHL, kurtosis, surface roughness
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