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Effect of Realistic Lubricant Properties on Thermal Electrohydrodynamic Lubrication Behavior in Circular Contacts

Authors : Puneet Katyal, Punit Kumar

Abstract : A great deal of efforts has been done in the field of thermal effects in electrohydrodynamic lubrication (TEHL) during the last five decades. The focus was primarily on the development of an efficient numerical scheme to deal with the computational challenges involved in the solution of TEHL model; however, some important aspects related to the accurate description of lubricant properties such as viscosity, rheology and thermal conductivity in EHL point contact analysis remain largely neglected. A few studies available in this regard are based upon highly complex mathematical models difficult to formulate and execute. Using a simplified thermal EHL model for point contacts, this work sheds some light on the importance of accurate characterization of the lubricant properties and demonstrates that the computed TEHL characteristics are highly sensitive to lubricant properties. It also emphasizes the use of appropriate mathematical models with experimentally determined parameters to account for correct lubricant behaviour.

Keywords : TEHL, shear thinning, rheology, conductivity
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