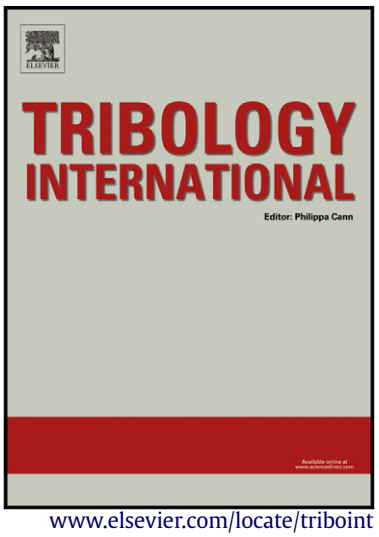

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A Study on the Effect of Starvation in Mixed Elastohydrodynamic Lubrication

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Abstract

The effect of starvation in mixed elastohydrodynamic lubrication (EHL) regime is studied. Numerical simulations are conducted for both line and point (elliptical) contact with the consideration of the surface roughness. The degree of starvation is linked directly to the reduction in the lubricant mass flow rate. Results are presented to gain insight on the influence of starvation on the film thickness as well as the interaction between the surface asperities. Extensive sets of simulation results are used to quantify the effect of starvation in the EHL of rough surfaces. Expressions are developed to predict the percentage of the load carried by the surface asperities (asperity load ratio) as well as the reduction of the central and minimum film thickness in the starved mixed EHL.

Keywords: *starvation degree, starved elastohydrodynamic lubrication, surface roughness, film thickness, asperity load ratio*

1. Introduction

Lubrication regime in many industrial applications is governed by the elastohydrodynamic lubrication (EHL). In such applications, when the lubricant quantity is sufficient to fill the contact's inlet, the lubrication regime is called fully-flooded. However, inadequate lubricant supply at the inlet's conjunction results in a lower flow rate of the lubricant that is necessary and the contact is said to be starved. Starved lubrication directly influences the thickness of the lubricant film and increases the asperity interactions that tend to expedites wear which if excessive can ultimately lead to failure.