

## **Modeling Cracks and Inclusions near Surface under EHL Conditions**

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Elastohydrodynamic lubrication (EHL) is a typical mode of fluid-film lubrication, in which the formation of the hydrodynamic film is enhanced by surface deformation and lubricant viscosity increase induced by high pressure. In previous study, materials in contact are traditionally assumed to be homogeneous. However, in applications micro-defects such as inclusions, cracks and dislocations may exist and influence the mechanism of materials. This study aims to obtain a semi-analytical solution to model multiple inhomogeneous inclusions and cracks in a half-space with lubricants between the contact interfaces. In developing the solution, inclusions are modeled by Eshelby's equivalent inclusion method, while cracks of mixed modes I and II are simulated according to the dislocation distribution technique. The surface displacements due to inclusions and cracks are introduced into the lubricant film thickness to obtain an accurate description of the fluid pressure profile. Analysis of the solution would be conducted to reveal the effect of subsurface inhomogeneous inclusions and cracks on lubricant film thickness, pressure distribution and subsurface stresses.

**Keywords:** Elastohydrodynamic lubrication (EHL), inhomogeneous inclusions, equivalent inclusion method, mixed mode cracks, dislocation distribution technique