EHL MODELING OF ANISOTROPIC MATERIAL FOR POINT CONTACTS

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EHL; Fluid lubrication; Modeling in tribology; Anisotropic material

ABSTRACT

Due to increasingly strict performance requirements, rolling bearings usually operate in very demanding conditions. In order to have a better understanding of the fatigue life of rolling bearings, the effect of lubricant pressure and material topology (e.g. surface roughness, inclusion, anisotropy) on subsurface stress distribution should be investigated [1][2]. On a macro scale, the bearing material can be considered as isotropic. However, on the scale of the elastohydrodynamic lubrication (EHL) contact region, the anisotropic feature which originates from crystals rotation may not be ignored. Detailed description of material anisotropy requires dense meshes, which results in huge computational effort and is therefore hard to employ in practical cases. In this work, the multigrid method [3] is applied to the coupled EHL modeling of anisotropic material for point contacts. The results show that the developed multigrid algorithm can solve the problem efficiently and accurately.

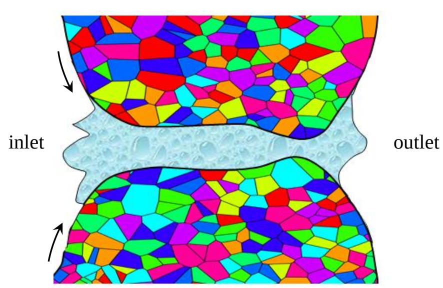

Fig.1 Schematic graph of an EHL lubricated conjunction with anisotropic material

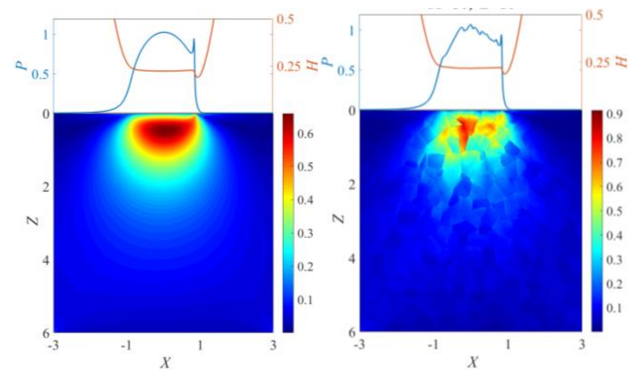

Fig.2 The influence of isotropy and polycrystalline anisotropy material on EHL pressure, film thickness and subsurface Von Mises stress distribution (Newtonian fluid, *L*=10, *M*=50)

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