

February 4, 2021

Bachelor-Thesis – numerical

Discretisation of the Couette Term in the Reynolds Equation

Background

Friction reduction in lubricated bearings can significantly increase the efficiency of machines. A well-directed change of the bearing geometry through surface textures can manipulate the lubrication film, thus resulting in higher load carrying abilities or lower friction losses of the bearing. The bearing's operating conditions can be replicated experimentally with tribometers. The numerical investigation is performed by modelling the lubrication film with the Reynolds equation. The combined experimental and numerical analysis of the conditions in the lubrication gap aims at finding general statements about the potential of surface texturing in bearings.

Content of the Thesis

During this thesis, different discretisation schemes of the Couette term in the Reynolds equation will be investigated. After implementing these schemes in an already existing MATLAB code, simulations of a lubrication gap will be performed. This way, statements about the convergence behaviour and the dependence of the results on the discretisation scheme will be made accessible. Exemplary results of the conditions in the lubrication gap of a pin-on-disc tribometer are shown in the Figure below.

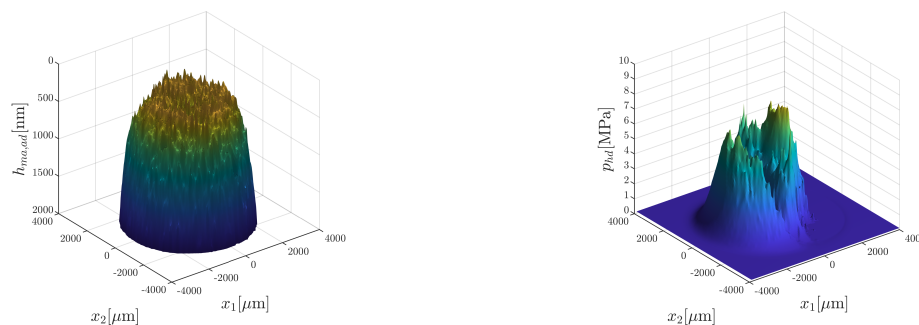


Figure: Elastically deformed pin profile and hydrodynamic pressure distribution.

Requirements:

Basic knowledge of numerical fluid mechanics and programming

Beneficial Skills:

MATLAB

Start: April 2021

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