26th July 2016
Bachelor-Master-Thesis – numerics

Numerical analysis of surface pattern for lubricant applications

Background

Tribological research aims at extending the period of usage and at saving resources by the improvement of the frictional behaviour of contacts. Microtexturing of a surface can be an efficient tool for this purpose. In recent years more and more attention is focused on surface patterns made by dimples. If well designed, this kind of texture is able to reduce the friction coefficient dramatically.

Content of the Thesis

The lubricant flow over this kind of surface textures can be studies with a simplification of the Navier-Stokes equation which is called Reynolds equation. The faster computation performances of the Reynolds equation lead to the possibility of a optimization study which can predict the optimal shape of the texture in order to reduce friction.

The Reynolds equation can also take into account thermal and cavitation effects. A new program is currently developed (in Matlab) with the Finite Volume Method and the student will have at first to add some useful modeling contribution to it. Finally the basis of an automatic optimization by means of genetic algorithm will be set.
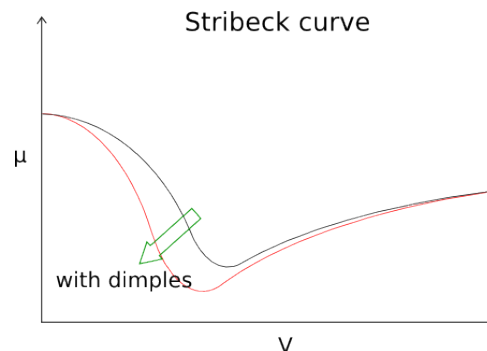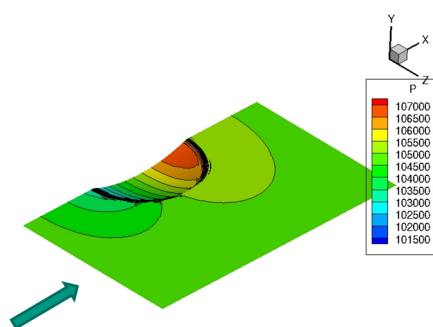
This thesis is available both in English and German.

Requirements
basic knowledge in fluid mechanics and programming

Beneficial Skills
knowledge about tribological flows, computational fluid mechanics, Matlab (and Fortran 90)

Start: immediately

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