

# Lubrication Regimes of Grease Lubricated Concentrated Contacts

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## Abstract.

The transitions between the different lubrication regimes, i.e. Elasto-Hydrodynamic Lubrication (EHL), Mixed Lubrication (ML) and Boundary Lubrication (BL), of grease lubricated concentrated contacts are studied. The aim of this study is to determine whether these transitions differ with the transitions for oil lubricated concentrated contacts which are studied extensively in literature, see for instance [1].

Friction tests are performed under conditions of simple sliding (i.e. pin sliding on a flat) in order to obtain Stribeck type of friction curves [2]. In these friction curves the different lubrication regimes can be distinguished. On the bases of these friction curves the transitions for grease and oil lubricated contacts are obtained and compared. The oil used in these experiments is the base oil of the grease.

With the existing grease models it is shown that wall slip is affecting the frictional behaviour of grease lubricated contacts. Therefore in these friction experiments the roughness is varied.

## Results:

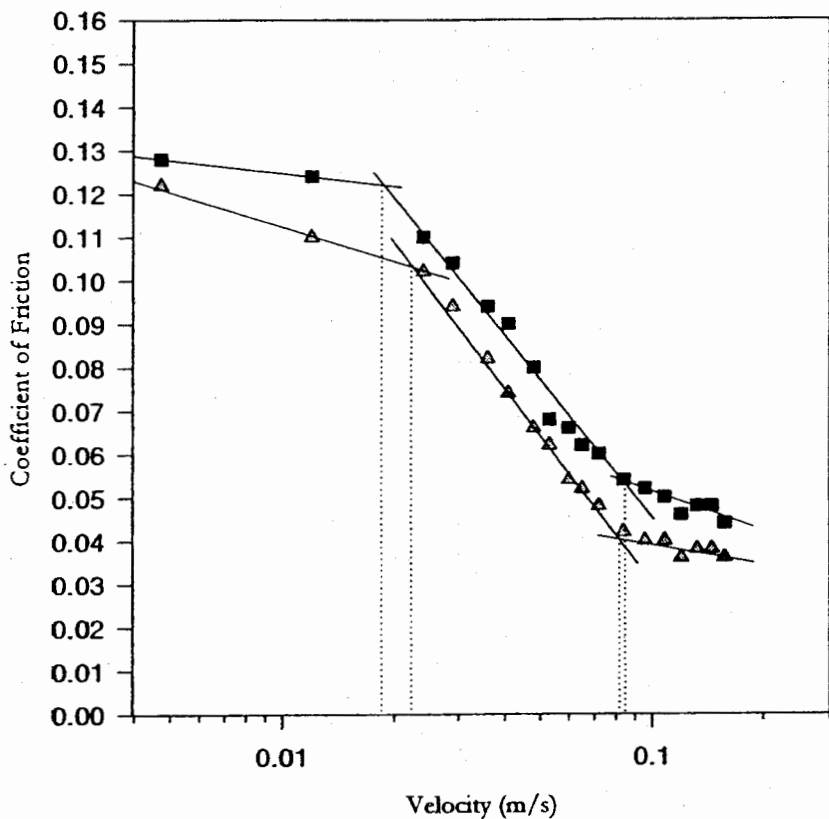
- It is shown that the transitions between the different lubrication regimes as found for grease lubricated concentrated contacts resemble with the transitions as found for oil lubricated contacts. On the basis of this result the conclusion is made that the base oil of the grease is determining the transition between the different lubrication regimes.
- The friction experiments with smooth surfaces showed the occurrence of wall slip.
- In order to avoid starvation it is important to keep during testing the grease in the contact.

[1] Schipper, D.J., 1988, "Transitions in the lubrication of concentrated contacts", PhD Thesis, University of Twente, Enschede, The Netherlands.

[2] Benes, J.G., 1997, "The influence of grease on the transitions of the different lubrication regimes", MSc. Thesis, University of Twente, The Netherlands.

Base oil:

1.  $p_{\text{Hertz}} = 0.25 \text{ GPa}$ .
2.  $\theta = 30 \text{ }^\circ\text{C}$  ( $\eta = 0.195 \text{ Pa}\cdot\text{s}$ ).
3.  $Ra_t = 0.11 \text{ } \mu\text{m}$ .



Grease:

1.  $p_{\text{Hertz}} = 0.25 \text{ GPa}$ .

2.  $\theta = 30 \text{ }^\circ\text{C}$  ( $\eta = 0.195 \text{ Pa}\cdot\text{s}$ ).

3.  $R_{a_t} = 0.11 \text{ } \mu\text{m}$ .

