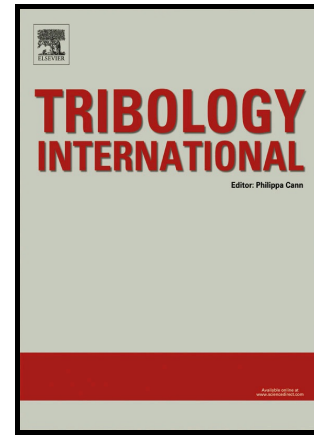


Author's Accepted Manuscript

A multiscale method for frictionless contact mechanics of rough surfaces

Y. Waddad, V. Magnier, P. Dufrénoy, G. De Saxcé



www.elsevier.com/locate/jtri

PII: S0301-679X(15)00591-5
DOI: <http://dx.doi.org/10.1016/j.triboint.2015.12.023>
Reference: JTRI3983

To appear in: *Tribology International*

Received date: 26 June 2015
Revised date: 23 November 2015
Accepted date: 20 December 2015

Cite this article as: Y. Waddad, V. Magnier, P. Dufrénoy and G. De Saxcé, A multiscale method for frictionless contact mechanics of rough surfaces *Tribology International*, <http://dx.doi.org/10.1016/j.triboint.2015.12.023>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

A multiscale method for frictionless contact mechanics of rough surfaces

Y.Waddad^{a,b,c,*}, V.Magnier^{a,b,c}, P.Dufrénoy^{a,b,c}, G.De Saxcé^{a,b,c}

^a Université Lille Nord de France, F-59000 Lille, France

^b Lille1-LML, F-59655 Villeneuve d'Ascq, France

^c CNRS, UMR 8107, F-59655 Villeneuve d'Ascq, France

Abstract

An efficient methodology is proposed for the analysis of frictionless contact between rough surfaces. The surface is described by parabolic asperities which deform according to Hertz Theory. The problem is solved considering interactions between elliptic contact zones. Such analysis provide interface laws that are incorporated into a macroscopic numerical model where contact surfaces are flat. This operation is done by means of Love solution for elastic half spaces and the penalty method.

A numerical example of this multiscale method is presented to show its robustness. In comparison with a purely numerical model where roughness is explicitly described, the proposed strategy provides good results and saves a considerable amount of time.

Keywords: Surface roughness, Hertz theory, Contact mechanics, Finite element method.

Introduction

Contact mechanics is a fundamental problem in mechanical engineering. It provides necessary information to design safely many systems that involve two or more bodies that are contacting each other, such as braking systems, blade-
5 abradable seals and many others.

*Corresponding author

Email address: waddad.yassine@gmail.com (Y.Waddad)

Download English Version:

<https://daneshyari.com/en/article/614185>

Download Persian Version:

<https://daneshyari.com/article/614185>

[Daneshyari.com](https://daneshyari.com)