

Author's Accepted Manuscript

Shear traction and sticking scope of frictional contact between two elastic Cylinders

Yaping Zhao



www.elsevier.com/locate/ijmecsci

PII: S0020-7403(14)00296-3

DOI: <http://dx.doi.org/10.1016/j.ijmecsci.2014.08.022>

Reference: MS2805

To appear in: *International Journal of Mechanical Sciences*

Received date: 28 March 2014

Revised date: 7 August 2014

Accepted date: 24 August 2014

Cite this article as: Yaping Zhao, Shear traction and sticking scope of frictional contact between two elastic Cylinders, *International Journal of Mechanical Sciences*, <http://dx.doi.org/10.1016/j.ijmecsci.2014.08.022>

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.

Shear Traction and Sticking Scope of Frictional Contact between Two Elastic Cylinders

Yaping Zhao *

School of Mechanical Engineering and Automation, Northeastern University,
Shenyang 110819, China

*Corresponding author. Email: zhyp_neu@163.com

Abstract

In this study, the frictional contact with partial slide between two dissimilar elastic cylinders is considered. According to the Spence's self-similarity condition, a system of singular integral equations is constructed with respect to the normal pressure and the shear traction in the contacting area. Based on the Goodman's hypothesis, the preceding system is uncoupled. From this, the tangential load in the central sticking zone is possible to be obtained analytically by means of the theory on the singular integral equation. Besides, a nonlinear equation in regard to the ratio of the adhesive and slip zone sizes is derived on the basis of the continuity of the tangential load. The stick zone size can thus be determined by solving the nonlinear equation mentioned above iteratively. The problem in question is additionally solved by utilizing numerical method to make verification and validation of the theory and the related prevision founded in the present paper. Numerical examples are provided to instantiate the theory and method proposed.

Key words

Contact mechanics; Integral equation; Friction; Adhesive contact; Numerical quadrature

1 Introduction

The theory laid down by Hertz [1, 2] for normal frictionless contact between two nonconforming bodies stands as a landmark in linear elasticity. It also stimulated the development of a new field of contact mechanics over the following century. The key assumptions in the classical Hertz theory were: (i) absence of friction in the contact, (ii) small size of the contact area compared to the dimensions of the contacting bodies and the radii of curvature of the contacting surfaces, and (iii) the presumed linear elastic material response.

Download English Version:

<https://daneshyari.com/en/article/7174303>

Download Persian Version:

<https://daneshyari.com/article/7174303>

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