

Accepted Manuscript

An effective method for the sliding frictional contact of a conducting cylindrical punch on FGPMs

Jie Su , Liao-Liang Ke , Sami El-Borgi , Yang Xiang ,
Yue-Sheng Wang

PII: S0020-7683(18)30064-7
DOI: [10.1016/j.ijsolstr.2018.02.017](https://doi.org/10.1016/j.ijsolstr.2018.02.017)
Reference: SAS 9905



To appear in: *International Journal of Solids and Structures*

Received date: 4 October 2017
Revised date: 31 December 2017
Accepted date: 10 February 2018

Please cite this article as: Jie Su , Liao-Liang Ke , Sami El-Borgi , Yang Xiang , Yue-Sheng Wang , An effective method for the sliding frictional contact of a conducting cylindrical punch on FGPMs, *International Journal of Solids and Structures* (2018), doi: [10.1016/j.ijsolstr.2018.02.017](https://doi.org/10.1016/j.ijsolstr.2018.02.017)

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 proof before it is published in its final 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.

An effective method for the sliding frictional contact of a conducting cylindrical punch on FGPMs

Jie Su^a, Liao-Liang Ke^{a*}, Sami El-Borgi^b, Yang Xiang^c, Yue-Sheng Wang^a

^a *Institute of Engineering Mechanics, Beijing Jiaotong University, Beijing, 100044, PR China*

^b *Texas A&M University at Qatar, Mechanical Engineering Program, Engineering Building, P.O. Box 23874, Education City, Doha, Qatar*

^c *School of Computing, Engineering and Mathematics, Western Sydney University, Penrith, NSW 2751, Australia*

Abstract

This paper presents an effective method to solve the sliding frictional contact between a rigid conducting cylindrical punch and a functionally graded piezoelectric coated half-plane. The electro-mechanical properties of the functionally graded piezoelectric materials (FGPMs) are position dependent along the thickness direction in the form of an exponential function against the thickness coordinate. A constant surface electric potential is assumed for the punch and the friction is of the Coulomb type. Using the superposition theorem and the Fourier integral transform, the present problem is reduced to a set of coupled Cauchy singular integral equations. These integral equations are then numerically discretized to form an overdetermined system which may lead to a non-unique solution for the conducting cylindrical punch problem. By using the least squares method together with an iterative procedure, the overdetermined algebraic equations are effectively solved to obtain the optimal solution. The effects of the friction coefficient and gradient index on the surface electro-mechanical fields are discussed.

Keywords: Friction; Conducting cylindrical punch; FGPM coating; Least squares method

*Corresponding author. Tel.: 86-10-51685663; Fax: 86-10-51682094.

E-mail address: llke@bjtu.edu.cn (L.L. Ke).

Download English Version:

<https://daneshyari.com/en/article/6748316>

Download Persian Version:

<https://daneshyari.com/article/6748316>

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