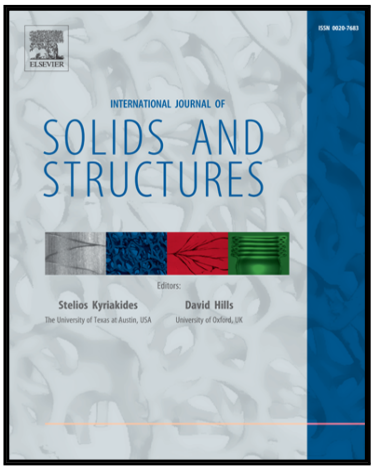
Accepted Manuscript



Local contact behavior between elastic and elastic–plastic bodies

Xiaoyun Dong , Xiaochun Yin , Qingming Deng , Bo Yu ,
Hui Wang , Panpan Weng , Chuanqing Chen , Hao Yuan

PII: S0020-7683(18)30213-0
DOI: 10.1016/j.ijsolstr.2018.05.020
Reference: SAS 10000

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

Received date: 30 January 2018
Revised date: 14 May 2018
Accepted date: 27 May 2018

Please cite this article as: Xiaoyun Dong , Xiaochun Yin , Qingming Deng , Bo Yu , Hui Wang , Panpan Weng , Chuanqing Chen , Hao Yuan , Local contact behavior between elastic and elastic–plastic bodies, *International Journal of Solids and Structures* (2018), doi: 10.1016/j.ijsolstr.2018.05.020

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.

Local contact behavior between elastic and elastic–plastic bodies

Xiaoyun Dong, Xiaochun Yin*, Qingming Deng, Bo Yu, Hui Wang, Panpan Weng, Chuanqing Chen, Hao Yuan

Department of Mechanics and Engineering Science, School of Science, Nanjing University of Science and Technology, Nanjing, 210094, China

*Corresponding author, Email address: yinxiaochun@njust.edu.cn; Fax:+86-25-8431 5875; Tel: +86-25-84315590

Abstract

The loading-unloading behavior of local contact between elastic body and elastic-ideally plastic body is studied analytically and numerically. An analytical model is derived based on the simulating results pertinent to Brinell indentation and elastic-plastic beam impact. The observed linear and nonlinear contact characters from simulations are introduced into the proposed analytical model. The contact law is expressed in much easier formulations by four normalized contact variables, normalized average contact pressure $\overline{\mathrm{H}}$, relative strain Λ, normalized contact area c^2 and relative contact force Ψ. The elastic loading is following Hertz contact theory. The linear contact laws for the elastic-plastic and fully plastic loadings and the nonlinear contact laws for the finite deformation loading are introduced in term of the finite element (FE) contact simulations pertinent to Brinell indentation. The coefficients in the contact law are determined by fitting the FE contact simulations and by satisfying the continuous conditions. The more suitable regime of Hertz solution and a refined force-indentation relation of unloading are introduced as well into the analytical model according to the FE impact simulations. The model is finally verified with the FE simulation and experiment of elastic-ideally beam struck by elastic sphere.

ACCEPTED MANUSCRIPT

Download English Version:

https://daneshyari.com/en/article/8947097

Download Persian Version:

https://daneshyari.com/article/8947097

Daneshyari.com