

Accepted Manuscript

Analytical solutions for the elastic fields caused by eigenstrains in two frictionlessly joined half-spaces

Hao Yu , Zhanjiang Wang , Qian Wang

PII: S0020-7683(16)30162-7
DOI: [10.1016/j.ijsolstr.2016.07.011](https://doi.org/10.1016/j.ijsolstr.2016.07.011)
Reference: SAS 9228



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

Received date: 12 January 2016
Revised date: 13 June 2016
Accepted date: 6 July 2016

Please cite this article as: Hao Yu , Zhanjiang Wang , Qian Wang , Analytical solutions for the elastic fields caused by eigenstrains in two frictionlessly joined half-spaces, *International Journal of Solids and Structures* (2016), doi: [10.1016/j.ijsolstr.2016.07.011](https://doi.org/10.1016/j.ijsolstr.2016.07.011)

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.

Analytical solutions for the elastic fields caused by eigenstrains in two frictionlessly joined half-spaces

Hao Yu¹, Zhanjiang Wang^{1*}, Qian Wang^{2,1**}

1* State Key Laboratory of Mechanical Transmission, Chongqing University, Chongqing
400030, China;

2 Department of Mechanical Engineering, Northwestern University, Evanston, Illinois 60208,
USA.

* Corresponding author
Email: wangzhanjiang001@gmail.com
Tel: 86-18502376952

** Corresponding author
Email: qwang@northwestern.edu
Tel: 1-8474677510

Abstract

Analytical solutions to the elastic fields induced by eigenstrains, such as plastic strains, in materials subjected to different types of joints are important for developing numerical simulations of advanced materials. This paper reports the derivation of a set of explicit integral kernels for the eigenstrain-induced elastic fields in two frictionlessly joined half-space solids or bi-materials. The elastic responses caused by arbitrary inclusions inside one of the two joined half-spaces are solved for the cases of known Galerkin vectors for the inclusion in the half-space solid. By discretizing the arbitrarily shaped single or multiple inclusions into a number of small elementary cuboids, the entire elastic response to the inclusions can be obtained through summation of the contributions from all elements with the assistance of the fast Fourier transform algorithms for convolution or correlation involved in the solutions. Cases for the elastic fields which subjected to a cuboidal, and a spherical, as well as multiple cuboidal inclusions are analyzed; and key results compared with the corresponding results for perfectly bonded half spaces. The phenomenon of probable interface separation associated with frictionless interfacial condition is further discussed.

Keywords: Micromechanics, inclusion, frictionlessly joined half-spaces, and fast Fourier transform (FFT)

Download English Version:

<https://daneshyari.com/en/article/4922725>

Download Persian Version:

<https://daneshyari.com/article/4922725>

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