Accepted Manuscript

Title: An Edge Dislocation and a Heat Source at the Center of a Multicoated Circular Inhomogeneity

Authors: Xu Wang, Kun Zhou



S0093-6413(17)30150-7 http://dx.doi.org/doi:10.1016/j.mechrescom.2017.06.013 MRC 3181

To appear in:

Received date:	23-3-2017
Revised date:	31-5-2017
Accepted date:	19-6-2017

Please cite this article as: Wang, Xu, Zhou, Kun, An Edge Dislocation and a Heat Source at the Center of a Multicoated Circular Inhomogeneity.Mechanics Research Communications http://dx.doi.org/10.1016/j.mechrescom.2017.06.013

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 Edge Dislocation and a Heat Source at the Center of a Multicoated Circular Inhomogeneity

Xu Wang^{a,*}, Kun Zhou^{b,*}

^aSchool of Mechanical and Power Engineering, East China University of Science and Technology, 130 Meilong Road, Shanghai 200237, China

^bSchool of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798, Singapore

*Corresponding authors: xuwang@ecust.edu.cn (X. Wang); kzhou@ntu.edu.sg (K. Zhou)

HIGHLIGHTS

- A closed-form solution for an edge dislocation in a multicoated inhomogeneity.
- A closed-form solution for a heat source in a multicoated inhomogeneity.
- The problem is reduced to a single linear algebraic equation.

Abstract. Closed-form solutions are derived to the problem of an edge dislocation or a steady line heat source at the center of a multicoated circular inhomogeneity by using the complex variable method and the transfer matrix method. The problem is reduced to a single linear algebraic equation which determines the single unknown real coefficient appearing in the complex stress functions defined in the surrounding matrix. The other unknown real coefficient in the complex stress functions in the inhomogeneity can then be conveniently determined.

Keywords: Multicoated Inhomogeneity; Edge dislocation; Heat source; Complex variable method; Transfer matrix method; Closed-form solution

1. Introduction

The determination of the elastic field induced by dislocations in composites is always a fascinating research topic in the mechanics and material communities [1]. Closed-form solutions exist when an edge dislocation is located inside or outside a circular inhomogeneity perfectly bonded to an infinite matrix [2-4]. However, generally speaking only series-form solutions can be obtained for an edge dislocation located at an arbitrary position in a three-phase composite in which a circular inhomogeneity is bonded to an infinite matrix through a coating layer [5-7]. On the other hand, thermal stress analysis of solids is important in practice and challenging in theory [8, 9] and has

Download English Version:

https://daneshyari.com/en/article/5018628

Download Persian Version:

https://daneshyari.com/article/5018628

Daneshyari.com