

Accepted Manuscript

Interface Cracks with Surface Elasticity in Anisotropic Bimaterials

Xu Wang, Kun Zhou, M.S. Wu

PII: S0020-7683(15)00034-7

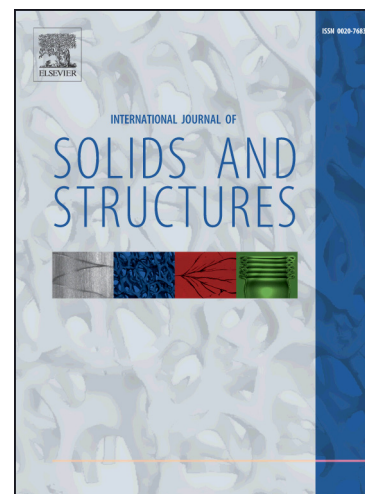
DOI: <http://dx.doi.org/10.1016/j.ijssolstr.2015.01.023>

Reference: SAS 8635

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

Received Date: 29 October 2014

Revised Date: 15 January 2015



Please cite this article as: Wang, X., Zhou, K., Wu, M.S., Interface Cracks with Surface Elasticity in Anisotropic Bimaterials, *International Journal of Solids and Structures* (2015), doi: <http://dx.doi.org/10.1016/j.ijssolstr.2015.01.023>

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.

Interface Cracks with Surface Elasticity in Anisotropic Bimaterials

Xu Wang^{a,b}, Kun Zhou^b, M. S. Wu^{b,*}

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

^b*School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50
Nanyang Avenue, Singapore 639798, Singapore*

Abstract. We consider the effect of surface elasticity on an interface crack between two dissimilar anisotropic elastic half-planes under generalized plane strain deformation. The surface mechanics is incorporated by using a modified anisotropic version of the continuum-based surface/interface model of Gurtin and Murdoch (1975). A system of first-order Cauchy singular integro-differential equations is derived by considering a distribution of line dislocations and line forces on the interface crack. The correctness of the obtained singular integro-differential equations is carefully verified by comparison with the existing results of Kim et al. (2010, 2011a,b,c), derived via the complex variable method. Our results show that generally the stresses exhibit only the weak logarithmic singularity at the tips of an interfacial crack when surface elasticity in anisotropic biomaterials is considered. Further, the crack-tip stresses in a homogeneous anisotropic solid exhibit both the stronger inverse square root and the weaker logarithmic singularities if the surface tension is ignored. The solution method for solving a system of singular integro-differential equations is also proposed.

Keywords: Surface elasticity; Anisotropic bimaterial; Interfacial crack; Green's function; Cauchy singular integro-differential equations

* Corresponding author. Tel: +65 6790 5545

E-mail address: mmswu@ntu.edu.sg (M.S. Wu)

Download English Version:

<https://daneshyari.com/en/article/6748914>

Download Persian Version:

<https://daneshyari.com/article/6748914>

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