

Accepted Manuscript

Analytical three-dimensional solutions of anisotropic multilayered composite plates with modified couple-stress effect

Junhong Guo, Jiangyi Chen, Ernian Pan

PII: S0263-8223(16)30364-6
DOI: <http://dx.doi.org/10.1016/j.compstruct.2016.05.089>
Reference: COST 7502

To appear in: *Composite Structures*

Received Date: 21 April 2016
Accepted Date: 23 May 2016



Please cite this article as: Guo, J., Chen, J., Pan, E., Analytical three-dimensional solutions of anisotropic multilayered composite plates with modified couple-stress effect, *Composite Structures* (2016), doi: <http://dx.doi.org/10.1016/j.compstruct.2016.05.089>

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 three-dimensional solutions of anisotropic multilayered composite plates with modified couple-stress effect

Junhong Guo^a, Jiangyi Chen^b, Ernian Pan^{c,*}

^aDepartment of Mechanics, Inner Mongolia University of Technology, Hohhot, 010051, China

^bSchool of Mechanical Engineering, Zhengzhou University, Zhengzhou, 450001, China

^cDepartment of Civil Engineering and Department of Applied Mathematics, The University of Akron, OH 44325-3905, USA

Abstract

Modified couple-stress theory has found many applications in fields related to nanocomposites. However, most investigations so far are based on the corresponding thin-plate or beam theories where the modified couple-stress theory was introduced. In this paper, we present analytical three-dimensional solutions of anisotropic multilayered composite plates with consideration of the modified couple-stress theory. We first expand the solutions in terms of the two-dimensional Fourier series in the horizontal plane to reduce the governing equations to a system of ordinary differential equations, from which we derive analytically the general solution in each layer. We then introduce the propagator matrix method to propagate the solutions from one layer to the next. Numerical examples are carried for homogeneous thick-plates and sandwich plates to show the effect of the non-local parameters on the displacements and stresses induced by the surface-loading. These results can serve as benchmarks to various thick plate theories in the modelling of layered composite structures with couple-stress effect.

Keywords: Modified couple-stress theory; multilayered plate; anisotropic; analytical solution; propagator matrix method

* Corresponding author.

E-mail address: pan2@uakron.edu (E. Pan)

Download English Version:

<https://daneshyari.com/en/article/6705264>

Download Persian Version:

<https://daneshyari.com/article/6705264>

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