

Accepted Manuscript

A unified solution for vibration analysis of functionally graded circular, annular and sector plates with general boundary conditions

Qingshan Wang, Dongyan Shi, Qian Liang, Xianjie Shi



PII: S1359-8368(15)00673-3

DOI: [10.1016/j.compositesb.2015.10.043](https://doi.org/10.1016/j.compositesb.2015.10.043)

Reference: JCOMB 3879

To appear in: *Composites Part B*

Received Date: 23 April 2015

Revised Date: 3 September 2015

Accepted Date: 12 October 2015

Please cite this article as: Wang Q, Shi D, Liang Q, Shi X, A unified solution for vibration analysis of functionally graded circular, annular and sector plates with general boundary conditions, *Composites Part B* (2015), doi: 10.1016/j.compositesb.2015.10.043.

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.

A unified solution for vibration analysis of functionally graded circular, annular and sector plates with general boundary conditions

Qingshan Wang^{1*}, Dongyan Shi¹, Qian Liang¹, Xianjie Shi²

¹College of Mechanical and Electrical Engineering, Harbin Engineering University, Harbin, 150001, PR China

²Institute of Systems Engineering, China Academy of Engineering Physics, Mianyang, 612900, PR China

ABSTRACT

The vibrations of functionally graded circular plates, annular plates, and annular, circular sectorial plates have been traditionally treated as different boundary value problems, which results in numerous specific solution algorithms and procedures. It is the problem itself that has been an overwhelming task for a new researcher or application engineer to comprehend. Furthermore each type of plate usually needs treating separately when different boundary conditions are involved. In this paper, a unified method is presented for the vibration analysis of the plates mentioned above with general boundary conditions based on the first-order shear deformation theory and Ritz procedure. The material properties are assumed to vary continuously through the thickness according to the general four-parameter power-law distribution. Regardless of the shapes of the plates and the types of boundary conditions, the displacements of the plates are described as an improved Fourier series expansion which is composed of a double Fourier cosine series and several auxiliary functions. As an innovative point of this work, the auxiliary functions are introduced to eliminate all the relevant discontinuities with the displacement and its derivatives at the boundaries

* Corresponding Author: Telephone: +86-451-82519797; Email: wangqingshanxlz@hotmail.com

Download English Version:

<https://daneshyari.com/en/article/7213004>

Download Persian Version:

<https://daneshyari.com/article/7213004>

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