

Accepted Manuscript

The Walsh series method for free vibration analysis of functionally graded cylindrical shells

Jianguo Fan, Jin Huang

PII: S0263-8223(18)31394-1

DOI: <https://doi.org/10.1016/j.compstruct.2018.08.089>

Reference: COST 10139

To appear in: *Composite Structures*

Received Date: 15 April 2018

Revised Date: 20 August 2018

Accepted Date: 29 August 2018



Please cite this article as: Fan, J., Huang, J., The Walsh series method for free vibration analysis of functionally graded cylindrical shells, *Composite Structures* (2018), doi: <https://doi.org/10.1016/j.compstruct.2018.08.089>

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.

The Walsh series method for free vibration analysis of functionally graded cylindrical shells

Jianguo Fan* and Jin Huang

Key Laboratory of Electronic Equipment Structure Design, Ministry of Education

Xidian University

Xi'an, China

Abstract

In this paper, a novel numerical method based on the Walsh series (WS) is proposed for free vibrations of functionally graded material (FGM) cylindrical shells. Based on the first order shear deformation theory, the governing equations of the FGM cylindrical shells are derived via the Hamilton's principle. After converting the governing equations into a set of ordinary differential equations (ODEs) by the separation of variables, the proposed Walsh series method (WSM) is utilized to transform the ODEs to algebraic equation sets, which results to a standard linear eigenvalue problem. The natural frequencies of the FGM cylindrical shell are calculated by solving the obtained algebraic equations. The convergence and accuracy analyses of the present method are performed by comparing the obtained results with those available in the existing literature. The results show that the solution of the proposed WSM is stably converged with the numerical convergence rate close to 2 and the good agreement of the obtained results with those in the available literature is also observed.

Finally, the parametric study is conducted to investigate the effects of several geometrical and

material parameters of the FGM cylindrical shells with various boundary conditions on the natural

* Corresponding author.

E-mail address: xdfjy1990@126.com

Download English Version:

<https://daneshyari.com/en/article/10131733>

Download Persian Version:

<https://daneshyari.com/article/10131733>

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