

Author's Accepted Manuscript

Vibration of thermally postbuckled sandwich plates with nanotube-reinforced composite face sheets resting on elastic foundations

Hui-Shen Shen, Hai Wang, De-Qing Yang



PII: S0020-7403(17)30583-0

DOI: <http://dx.doi.org/10.1016/j.ijmecsci.2017.03.015>

Reference: MS3627

To appear in: *International Journal of Mechanical Sciences*

Received date: 15 August 2016

Revised date: 3 February 2017

Accepted date: 8 March 2017

Cite this article as: Hui-Shen Shen, Hai Wang and De-Qing Yang, Vibration of thermally postbuckled sandwich plates with nanotube-reinforced composite face sheets resting on elastic foundations, *International Journal of Mechanical Sciences*, <http://dx.doi.org/10.1016/j.ijmecsci.2017.03.015>

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 a review of the resulting galley proof before it is published in its final citable 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

Vibration of thermally postbuckled sandwich plates with nanotube-reinforced composite face sheets resting on elastic foundations

Hui-Shen Shen^{1,2*}, Hai Wang¹, De-Qing Yang²

¹School of Aeronautics and Astronautics, Shanghai Jiao Tong University, Shanghai 200240, People's Republic of China

²School of Ocean and Civil Engineering, Shanghai Jiao Tong University, Shanghai 200240, People's Republic of China

Corresponding author. E-mail address: hsshens@mail.sjtu.edu.cn (H-S Shen)

Abstract

This paper investigates the small- and large-amplitude vibrations of thermally postbuckled sandwich plates with carbon nanotube-reinforced composite (CNTRC) face sheets resting on elastic foundations. Two types of CNTRC face sheets, namely, uniformly distributed (UD) and functionally graded (FG) reinforcements, are considered. The material properties of FG-CNTRCs are assumed to be graded in the thickness direction, and are estimated through a micromechanical model. The material properties of both CNTRC face sheets and homogeneous core layer are assumed to be temperature-dependent. The motion equations are derived based on a higher order shear deformation plate theory. The nonlinearity effect is taken into account in the sense of von Kármán nonlinear kinematic assumption. The plate-foundation interaction and the initial deflection caused by thermal postbuckling are also included. The numerical illustrations concern small- and large-amplitude vibration characteristics of thermally postbuckled sandwich plates with CNTRC face sheets under uniform temperature field. The effects of CNT volume fraction and distribution pattern of face sheets, the core-to-face sheet thickness ratio as well as foundation stiffness on the vibration characteristics of sandwich plates are examined in detail.

Keywords: Nanocomposites; Functionally graded materials; Temperature-dependent properties; Plates; Vibration

1. Introduction

Download English Version:

<https://daneshyari.com/en/article/5016254>

Download Persian Version:

<https://daneshyari.com/article/5016254>

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