Accepted Manuscript

Thermal postbuckling of nanotube-reinforced composite cylindrical panels resting on elastic foundations

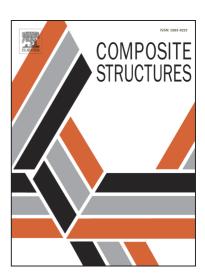
Hui-Shen Shen, Y. Xiang

PII: S0263-8223(14)00725-9

DOI: http://dx.doi.org/10.1016/j.compstruct.2014.12.059

Reference: COST 6119

To appear in: Composite Structures



Please cite this article as: Shen, H-S., Xiang, Y., Thermal postbuckling of nanotube-reinforced composite cylindrical panels resting on elastic foundations, *Composite Structures* (2015), doi: http://dx.doi.org/10.1016/j.compstruct. 2014.12.059

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.

ACCEPTED MANUSCRIPT

Thermal postbuckling of nanotube-reinforced composite cylindrical panels resting on elastic foundations

Hui-Shen Shen 1,*, Y. Xiang 2

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

² School of Computing, Engineering and Mathematics, University of Western Sydney, Locked Bag 1797, Penrith, NSW 2751, Australia

Abstract

This paper presents an investigation on the thermal postbuckling behavior of nanocomposite cylindrical panels resting on elastic foundations and subjected to a uniform temperature rise. The cylindrical panels are made of carbon nanotube reinforced composite (CNTRC) material with the carbon nanotube reinforcement being distributed along the thickness of the panels either uniformly (UD) or functionally graded (FG). A micromechanical model together with molecular dynamics simulation results is employed to obtain the material properties of the FG-CNTRC panels. The governing equations for the cylindrical panels are based on a higher-order shear deformation theory with a von Kármán-type of kinematic nonlinearity. The panel-foundation interaction and thermal effects are also included. The material properties of CNTRCs are assumed to be temperature-dependent and an iterative scheme is developed to obtain numerical results. The results reveal that the nanotube volume fraction, foundation stiffness, and the panel curvature ratio have a significant effect on the thermal postbuckling behavior of CNTRC cylindrical panels. It is found that in most cases the CNTRC panel with intermediate nanotube volume fraction does not necessarily have intermediate thermal postbuckling strength.

Key words: Nanocomposites; Functionally graded materials; Cylindrical panel; Thermal postbuckling; Temperature-dependent properties; Elastic foundation

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

Download English Version:

https://daneshyari.com/en/article/6707056

Download Persian Version:

https://daneshyari.com/article/6707056

<u>Daneshyari.com</u>