

Accepted Manuscript

Effects of neutral surface deviation on nonlinear resonance of embedded temperature-dependent functionally graded nanobeams

Yu-gang Tang, Ying Liu, Dong Zhao

PII: S0263-8223(17)30095-8
DOI: <https://doi.org/10.1016/j.compstruct.2017.10.058>
Reference: COST 9033

To appear in: *Composite Structures*

Received Date: 11 January 2017
Revised Date: 13 October 2017
Accepted Date: 18 October 2017



Please cite this article as: Tang, Y-g., Liu, Y., Zhao, D., Effects of neutral surface deviation on nonlinear resonance of embedded temperature-dependent functionally graded nanobeams, *Composite Structures* (2017), doi: <https://doi.org/10.1016/j.compstruct.2017.10.058>

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.

Effects of neutral surface deviation on nonlinear resonance of embedded temperature-dependent functionally graded nanobeams

Yu-gang Tang, Ying Liu*, Dong Zhao

Department of Mechanics, School of Civil Engineering, Beijing Jiaotong University, Beijing 100044, PR China

*Email: yliu5@bjtu.edu.cn; Tel: 86-10-51688763; Fax: 86-10-51682094

Abstract

In this paper, forced vibration of functionally graded (FG) nanobeams resting on the nonlinear elastic foundations are investigated based on the nonlocal strain gradient theory. The material parameters of FG nanobeams are assumed to be temperature-dependent and change continuously along the thickness direction according to the power-law function (PFGM) or sigmoid function (SFGM). Based on the Euler–Bernoulli beam theory and von-Kármán geometric nonlinearity, the governing equations of motion are derived by considering the deviation between the geometrical and physical neutral surfaces. Closed-form approximate solution for nonlinear forced vibration of a FG nanobeam is derived by using multiple time scale method. The results show that decrease of non-homogeneity index and material length scale parameter, or increase of temperature variation and nonlocal parameter will increase the resonance frequencies of FG nanobeams. The effect of the in-coincidence of physical and geometrical neutral surfaces on the nonlinear resonance of the nanobeams could not be ignored, especially for SFGM nanobeams with larger non-homogeneity index and stronger size effects, embedded in a softer medium

Download English Version:

<https://daneshyari.com/en/article/6705000>

Download Persian Version:

<https://daneshyari.com/article/6705000>

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