Accepted Manuscript

Thermoelastic nonlinear frequency analysis of CNT reinforced functionally graded sandwich structure

Kulmani Mehar, Subrata Kumar Panda

PII: S0997-7538(17)30110-9

DOI: 10.1016/j.euromechsol.2017.05.005

Reference: EJMSOL 3439

To appear in: *European Journal of Mechanics / A Solids*

Received Date: 7 February 2017

Revised Date: 12 April 2017

Accepted Date: 17 May 2017

Please cite this article as: Mehar, K., Panda, S.K., Thermoelastic nonlinear frequency analysis of CNT reinforced functionally graded sandwich structure, *European Journal of Mechanics / A Solids* (2017), doi: 10.1016/j.euromechsol.2017.05.005.

Thermoelastic Nonlinear Frequency Analysis of CNT Reinforced Functionally Graded Sandwich Structure

Kulmani Mehar[1], Subrata Kumar Panda[2]

[1,2] Department of Mechanical Engineering, National Institute of Technology Rourkela, Odisha, India

[3] Department of Mechanical Engineering, RSR, RCET, Chhattisgarh, India

Abstract: The nonlinear eigenfrequency responses of the functionally graded single-walled carbon nanotube reinforced sandwich structure is investigated numerically considering the Green-Lagrange nonlinear strain under uniform thermal environment. The mathematical model of the sandwich plate has been derived using the simple higher-order shear deformable kinematics including the temperature dependent properties of each constituent. The sandwich panel constitutes of graded carbon nanotube face sheets and homogeneous core. The desired nonlinear finite element solutions are obtained via the direct iterative method. Based on the necessary validation and convergence new results are computed for different design related parameters and discussed subsequently.

Keywords: CNT; FEM; HSDT; nonlinear vibration; sandwich plate; uniform thermal environment

1 INTRODUCTION

Carbon nanotubes (CNTs) possesses unique and multi-use features such as excellent specific strength, high aspect ratio with extraordinary thermal and electric properties. This makes CNT to an excellent reinforcement material in the polymer matrix and subsequently forced to replace the conventionally available fiber or reinforcement material in the hybrid composite material [1,

[1] Lead author: Research Scholar, Department of Mechanical Engineering, National Institute of Technology Rourkela. Email: kulmanimehar@gmail.com

[2] Corresponding author: Assistant Professor, Department of Mechanical Engineering, National Institute of Technology Rourkela, Odisha, India. Email: call2subrat@gmail.com, pandask@nitrkl.ac.in