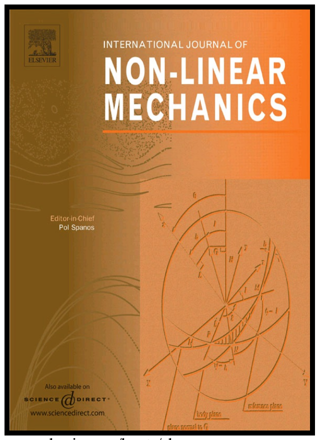
Author's Accepted Manuscript



www.elsevier.com/locate/nlm

Free Vibration Analysis of Curved Nanotube Structures

Hamidreza Yazdani Sarvestani, Hossein Ghayoor

PII: S0020-7462(16)30118-4
DOI: http://dx.doi.org/10.1016/j.ijnonlinmec.2016.09.001
Reference: NLM2701

To appear in: *International Journal of Non-Linear Mechanics*

Received date: 25 October 2015
Revised date: 14 August 2016
Accepted date: 1 September 2016

Cite this article as: Hamidreza Yazdani Sarvestani and Hossein Ghayoor, Fre Vibration Analysis of Curved Nanotube Structures, *International Journal o Non-Linear Mechanics,* http://dx.doi.org/10.1016/j.ijnonlinmec.2016.09.001

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, an review of the resulting galley proof before it is published in its final citable forn Please note that during the production process errors may be discovered whic could affect the content, and all legal disclaimers that apply to the journal pertain

ACCEPTED MANUSCRIPT

Free Vibration Analysis of Curved Nanotube Structures

Hamidreza Yazdani Sarvestani*, Hossein Ghayoor
Department of Mechanical and Industrial Engineering, Concordia University, Montreal, Canada H3G 1M8
*Corresponding author: h_yazd@encs.concordia.ca

Abstract

In reality, nanotubes may not be straight structures. In this work, we study free vibration analysis of curved nanotubes based on a proposed nonlocal shell model. The free vibration of curved single-walled nanotubes (SWNTs), double-walled nanotubes (DWNTs) and multi-walled nanotubes (MWNTs) is analyzed. The governing equations of a curved nanotube are developed using the proposed nonlocal shell model based on elasticity theory of Eringen. Governing differential equations of motion are simplified to the ordinary differential equations using Fourier series expansion. And solutions are obtained by applying Galerkin method. Results obtained by the present model are verified by those presented in the literature. The numerical results demonstrate the effects of the curved nanotube length, thickness, bend angle and nonlocal parameter on the natural fundamental frequency.

Keywords: Curved nanotube structures; Free vibration; Nonlocal shell model; Nonlocal parameter.

1. Introduction

Remarkable physical properties of carbon nanotubes (CNTs) offer excellent potential uses for many advanced applications which accentuate analyzing CNTs. Arash and Wang [1] presented a comprehensive review on applications of nonlocal elastic models for CNTs. Atomistic modeling and continuum mechanics are two approaches in theoretical analysis of CNTs. The atomistic modeling of nanostructures is complicated and time-consuming. Therefore, the continuum modeling has drawn a lot of attentions for studying different aspects of nanostructures. A comprehensive review of the modeling and simulation of CNTs concentrating on mechanical, buckling, vibrational and thermal properties is available in [2]. In another study, the mechanical behavior of nanotubes, both theoretically and experimentally was covered to allow for a realistic prediction of mechanical behavior of defected tubes [3].

Accepted manuscript

Download English Version:

https://daneshyari.com/en/article/7174555

Download Persian Version:

https://daneshyari.com/article/7174555

Daneshyari.com