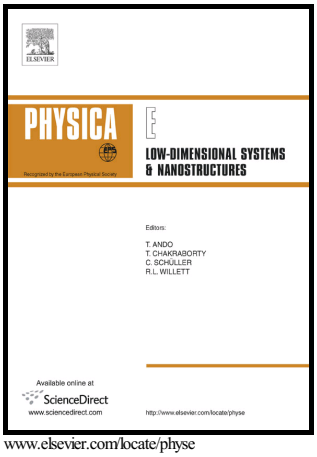
Wave dispersion of carbon nanotubes conveying fluid Supported on linear viscoelastic two-parameter foundation including thermal and small-scale effects

Nima Sina, Hassan Moosavi, Hosein Aghaei, Masoud Afrand, Somchai Wongwises



www.elsevier.com/locate/physe

PII: S1386-9477(16)30308-3
DOI: http://dx.doi.org/10.1016/j.physe.2016.06.022
Reference: PHYSE12497

To appear in: *Physica E: Low-dimensional Systems and Nanostructures*

Received date: 27 April 2016
Revised date: 1 June 2016
Accepted date: 17 June 2016

Cite this article as: Nima Sina, Hassan Moosavi, Hosein Aghaei, Masoud Afranc and Somchai Wongwises, Wave dispersion of carbon nanotubes conveying fluic Supported on linear viscoelastic two-parameter foundation including thermal an small-scale effects, *Physica E: Low-dimensional Systems and Nanostructures* http://dx.doi.org/10.1016/j.physe.2016.06.022

Wave Dispersion of Carbon Nanotubes Conveying Fluid Supported on Linear Viscoelastic Two-Parameter Foundation Including Thermal and Small-Scale Effects

Nima Sina[a], Hassan Moosavi[b], Hosein Aghaei[b], Masoud Afrand[a,*], Somchai Wongwises[c]

[a] Department of Mechanical Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Iran

[b] Department of Mechanical Engineering, Isfahan University of Technology, Isfahan, Iran

[c] Fluid Mechanics, Thermal Engineering and Multiphase Flow Research Lab., Department of Mechanical Engineering, Faculty of Engineering, King Mongkut's University of Technology Thonburi, Bangmod, Bangkok 10140, Thailand

* Corresponding author

Emails: masoud.afrand@pmc.iaun.ac.ir & masoud_afrand@yahoo.com

Abstract

In this paper, for the first time, a nonlocal Timoshenko beam model is employed for studying the wave dispersion of a fluid-conveying single-walled carbon nanotube on Viscoelastic Pasternak foundation under high and low temperature change. In addition, the phase and group velocity for the nanotube are discussed, respectively. The influences of Winkler and Pasternak modulus, homogenous temperature change, steady flow velocity and damping factor of viscoelastic foundation on wave dispersion of carbon nanotubes are investigated. It was observed that the characteristic of the wave for carbon nanotubes conveying fluid is the normal dispersion. Moreover, implying viscoelastic foundation leads to increasing the wave frequencies.

Keywords: Wave dispersion; Carbon nanotubes; viscoelastic foundation; high and low temperature change; phase and group velocity