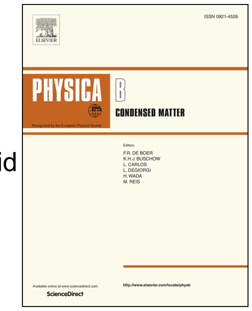
Accepted Manuscript



Flutter and divergence instability of supported piezoelectric nanotubes conveying fluid

Reza Bahaadini, Mohammad Hosseini, Behnam Jamali

PII: S0921-4526(17)30725-1
DOI: 10.1016/j.physb.2017.09.130
Reference: PHYSB 310356

To appear in: *Physica B: Physics of Condensed Matter*

Received Date: 2 July 2017
Revised Date: 8 September 2017
Accepted Date: 29 September 2017

Please cite this article as: R. Bahaadini, M. Hosseini, B. Jamali, Flutter and divergence instability of supported piezoelectric nanotubes conveying fluid, *Physica B: Physics of Condensed Matter* (2017), doi: 10.1016/j.physb.2017.09.130.

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.

Flutter and divergence instability of supported piezoelectric nanotubes conveying fluid

Reza Bahaadini[1], Mohammad Hosseini[*2], Behnam Jamali[2]

[1] Department of Mechanical Engineering, Shahid Bahonar University of Kerman, Kerman, I.R. Iran

[2] Department of Mechanical Engineering, Sirjan University of Technology, 78137-33385 Sirjan, I.R. Iran

Abstract

In this paper, divergence and flutter instabilities of supported piezoelectric nanotubes containing flowing fluid are investigated. To take the size effects into account, the nonlocal elasticity theory is implemented in conjunction with the Euler-Bernoulli beam theory incorporating surface stress effects. The Knudsen number is applied to investigate the slip boundary conditions between the flow and wall of nanotube. The nonlocal governing equations of nanotube are obtained using Newtonian method, including the influence of piezoelectric voltage, surface effects, Knudsen number and nonlocal parameter. Applying Galerkin approach to transform resulting equations into a set of eigenvalue equations under the simple-simple (S-S) and clamped-clamped (C-C) boundary conditions. The effects of the piezoelectric voltage, surface effects, Knudsen number, nonlocal parameter and boundary conditions on the divergence and flutter boundaries of nanotubes are discussed. It is observed that the fluid-conveying nanotubes with both ends supported lose their stability by divergence first and then by flutter with increase in fluid velocity. Results indicate the importance of using piezoelectric voltage, nonlocal parameter and Knudsen number in decrease of critical flow velocities of system.

[*] Corresponding author. Tel.: +98 34 42 33 69 01 ; Fax: +98 34 42 33 69 00
E-mail addresses: hosseini@sirjantech.ac.ir, moh_hosseini@yahoo.com (M. Hosseini)

ACCEPTED MANUSCRIPT

Download English Version:

https://daneshyari.com/en/article/8161642

Download Persian Version:

https://daneshyari.com/article/8161642

Daneshyari.com