

## عنوان مقاله:

Analysis of Nonlinear Vibrations for Multi-walled Carbon Nanotubes Embedded in an Elastic Medium

**محل انتشار:** فصلنامه مکانیک جامد, دوره 3, شماره 3 (سال: 1390)

تعداد صفحات اصل مقاله: 13

## نویسندگان:

A Ghorbanpour Arani - Faculty of Mechanical Engineering, University of Kashan--- Institute of Nanoscience & Nanotechnology, University of Kashan

H Rabbani - Faculty of Mechanical Engineering, University of Kashan

S Amir - Department of Mechanical Engineering, Kashan Branch, Islamic Azad University

Z Khoddami Maraghi - Faculty of Mechanical Engineering, University of Kashan

M Mohammadimehr - Faculty of Mechanical Engineering, University of Kashan

E Haghparast - Faculty of Mechanical Engineering, University of Kashan

## خلاصه مقاله:

Nonlinear free vibration analysis of double-walled carbon nanotubes (DWCNTs) embedded in an elastic medium is studied in this paper based on classical (local) Euler-Bernoulli beam theory. Using the averaging method, the nonlinear free vibration responses of DWCNTs are obtained. The result is compared with the obtained results from the harmonic balance method for single-walled carbon nanotubes (SWCNTs) and DWCNTs. The effects of the surrounding elastic medium, van der waals (vdW) forces and aspect ratio of SWCNTs and DWCNTs on the vibration amplitude are discussed. The error percentage of the nonlinear free vibration frequencies between two theories decreases with increasing the spring constant of elastic medium. Results are also shown that if the value of the spring constant on frequency responses is significant, while if the value of the spring constant is higher than (), the curve of frequency responses has a constant value near to 1 and therefore the effect of the spring constant on frequency responses is negligible

## کلمات کلیدی:

Nonlinear vibration, Nanotubes, Van der Waals, Euler-Bernoulli beam, Natural frequency

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