

عنوان مقاله:

Vibration Analysis of an Initially Pre-stressed Rotating Carbon Nanotube Employing Differential Transform Method

محل انتشار:

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خلاصه مقاله:

Abstract: In this paper, nonlocal Euler–Bernoulli beam theory is employed for transverse vibration analysis of an initially pre-stressed size-dependent rotating nanotube. The nonlocal Eringen theory takes into account the effect of small size, which enables the present model to become effective in the analysis and design of nanosensors and nanoactuators. Governing equations are derived through Hamilton's principle and they are solved applying semi analytical differential transform method (DTM). It is demonstrated that the DTM has high precision and computational efficiency in the vibration analysis of nanotubes. The good agreement between the results of this article and those available in literature validated the presented approach. The detailed mathematical derivations are presented and numerical investigations are performed while the emphasis is placed on investigating the effect of the several parameters such as preload stress, hub radius, angular velocity and small scale parameter on vibration behaviour rotating nanotubes in detail. It is explicitly shown that the vibration of a spinning nanotube is significantly influenced by these effects. Keywords: Spinning carbon nanotube; Vibration; Differential Transform method; Nonlocal Elasticity Theory

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