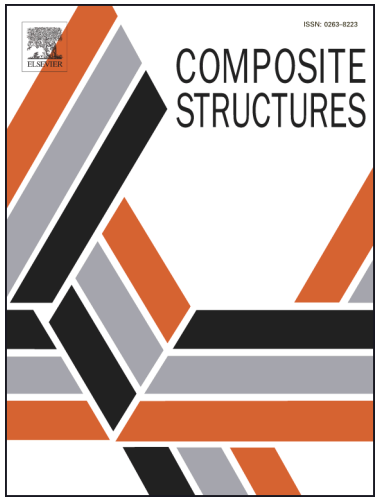

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Exact solution for free vibrations of spinning nanotube based on nonlocal first order shear deformation shell theory

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Abstract

Spinning nanotubes are the main part of power transmission units in Nano-machines. So, having proper information about the dynamic behavior of them are very important. So, as the basis of each dynamics problem free vibration of spinning nanotube is analyzed in this paper. For this purpose, Sanders first order shear deformation shell theory is combined with nonlocal elasticity and equations of motion are found. For the first time, equations are exactly solved for all classical combinations of boundary conditions. Validity and accuracy of present method are checked with literature in different tables and figures. As benchmark analysis, effects of changing geometrical parameters, spinning speed, nonlocal parameter, and boundary conditions on natural frequencies and critical speeds of nanotube is studied which will be helpful for future investigations.

***Keywords*:** Rotating nanotube, Spinning nanotube, Nonlocal elasticity, Sanders theory, Free vibrations, Critical speed.

1. Introduction

Todays, researchers concentrate on design and analysis of low scale machines because they have high performance and efficiency despite of their low dimensions. Studies show that the

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