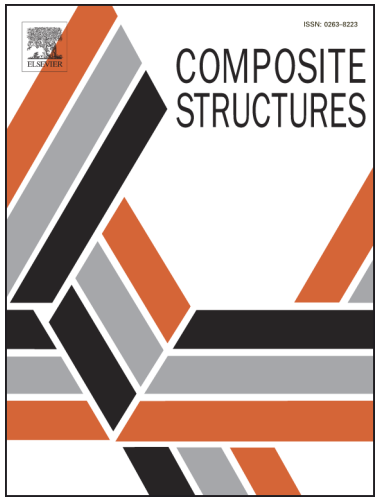

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Free vibration of viscoelastic double-bonded polymeric nanocomposite plates reinforced by FG-SWCNTs using MSGT, sinusoidal shear deformation theory and meshless method

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Abstract

Free vibration of viscoelastic double-bonded polymeric nanocomposite plate reinforced by FG-SWCNTs embedded in viscoelastic foundation based on MSGT is investigated. Different distributions of SWCNTs are considered as: UD, FG-V, FG-X and FG-O. Material properties of viscoelastic nanocomposite plates are defined by extended mixture rule (EMR). The governing equations of motion are extracted using Hamilton's principle and sinusoidal shear deformation theory. Then, natural frequency of nanocomposite plates is determined by Navier's and meshless methods. The effects of material length scale parameters, aspect ratio, structural damping and foundation damping coefficients, elastic foundation parameters, magnetic field, van der Waals(vdW) interaction on non-dimensional natural frequency are investigated. The results illustrate that the elastic foundation, vdW interaction and magnetic field increase the dimensionless natural frequency of the double-bonded nanocomposite plates for CT, MCST and MSGT. The material length scale parameter effects on the non-dimensional natural frequency of the double bonded nanocomposite plates is negligible at $h/l \geq 5$ for CT, and MCST and MSGT. Also, using meshless method, effect of various boundary conditions on dimensionless natural frequency is investigated and the results are compared with the obtained results by other literatures that have a good agreement between them. The obtained results can be employed for MEMS and NEMS.

Keywords: Free vibration; Viscoelastic double bonded polymeric nanocomposite plate; Various distributions of SWCNTs; MSGT; Sinusoidal shear deformation plate theory; Navier and meshless methods.

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