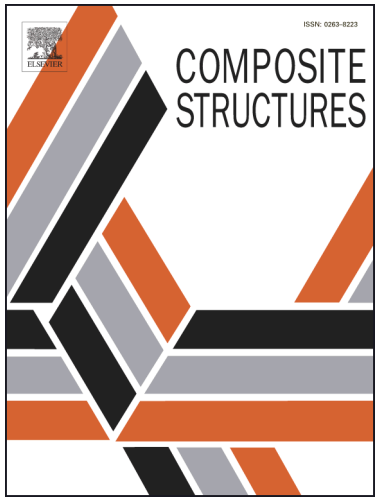

Damping vibration analysis of graphene sheets on viscoelastic medium incorporating hygro-thermal effects employing nonlocal strain gradient theory

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Damping vibration analysis of graphene sheets on viscoelastic medium incorporating hygro-thermal effects employing nonlocal strain gradient theory

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Abstract

In the present article, a nonlocal strain gradient plate model is developed for damping vibration analysis of viscoelastic graphene sheets under hygor-thermal environments. For more accurate analysis of graphene sheets, the proposed theory contains two scale parameters related to the nonlocal and strain gradient effects. Graphene sheet is modeled via a two-variable shear deformation plate theory needless of shear correction factors. Governing equations of a nonlocal strain gradient graphene sheet on viscoelastic substrate are derived via Hamilton's principle. Differential Quadrature Method (DQM) is implemented to solve the governing equations for different boundary conditions. Effects of different factors such as temperature rise, nonlocal parameter, length scale parameter, elastic foundation and aspect ratio on vibration characteristics a graphene sheets are studied.

Keywords: Damping vibration, Refined plate theory, Graphene sheets, Nonlocal strain gradient theory, Hygro-thermal loading.

1. Introduction

In recent years, the nanostructures including the nanotubes and nanosheets with carbon atoms have been provided superior mechanical and electrical properties and received a great attention