عنوان مقاله:

Thermal Buckling Analysis of Circular Bilayer Graphene Sheets Resting on an Elastic Matrix Based on Nonlocal Continuum Mechanics

محل انتشار:

مجله مکانیک کاربردی و محاسباتی, دوره 7, شماره 4 (سال: 1400)

تعداد صفحات اصل مقاله: 16

نویسندگان:

M. Ahmad Pour - *Department of Mechanical Engineering, Mashhad Branch, Islamic Azad University, Mashhad, Iran*

M.E. Golmakani - *Department of Mechanical Engineering, Mashhad Branch, Islamic Azad University, Mashhad, Iran*

M. Malikan - *Department of Mechanical Engineering, Mashhad Branch, Islamic Azad University, Mashhad, Iran*

خلاصه مقاله:

In this article, the thermal buckling behavior of orthotropic circular bilayer graphene sheets embedded in the Winkler–Pasternak elastic medium is scrutinized. Using the nonlocal elasticity theory, the bilayer graphene sheets are modeled as a nonlocal double–layered plate that contains small scale effects and van der Waals (vdW) interaction forces. The vdW interaction forces between the layers are simulated as a set of linear springs using the Lennard–Jones potential model. Using the principle of virtual work, the set of equilibrium equations are obtained based on the first-order shear deformation theory (FSDT) and nonlocal differential constitutive relation of Eringen. Differential quadrature method (DQM) is employed to solve the governing equations for simply-supported and clamped boundary conditions. Finally, the effects of the small scale parameter, vdW forces, aspect ratio, elastic foundation, and boundary conditions are considered in detail.

کلمات کلیدی:

Thermal buckling, Bilayer graphene sheets, elastic medium, Nonlocal elasticity, van der Waals forces, First-order shear deformation theory, Differential quadrature method