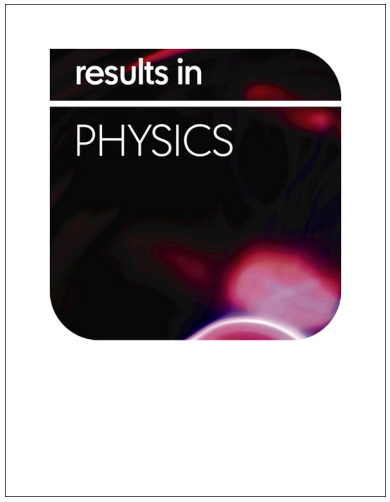

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Vibration and bending behavior of functionally graded nanocomposite doubly-curved shallow shells reinforced by graphene nanoplatelets

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ABSTRACT

Free vibration and static bending of functionally graded(FG) graphene nanoplatelet(GPL) reinforced composite doubly-curved shallow shells with three distinguished distributions are analyzed. Material properties with gradient variation in the thickness aspect are evaluated by the modified Halpin-Tsai model. Mathematical model of the simply supported doubly-curved shallow shells rests upon Hamilton Principle and a higher order shear deformation theory(HSDT). The free vibration frequencies and bending deflections are gained by taking into account Navier technique. The agreement between the obtained results and ANSYS as well as the prior results in the open literature verifies the accuracy of the theory in this article. Further, parametric studies are accomplished to highlight the significant influence of GPL distribution patterns and weight fraction, stratification number, dimensions of GPLs and shells on the mechanical behavior of the system.

Key words: Functional graded nanocomposite; Graphene nanoplatelets; Doubly-curved shallow shells; Mechanical behavior

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