

Biaxial Buckling of Single Layer Graphene Sheet Based on Nonlocal Plate Model and Molecular Dynamics Simulation

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Abstract : The biaxial buckling behavior of single-layered graphene sheets (SLGSs) is studied in the present work. To consider the size-effects in the analysis, Eringen's nonlocal elasticity equations are incorporated into classical plate theory (CLPT). A Generalized Differential Quadrature Method (GDQM) approach is utilized and numerical solutions for the critical buckling loads are obtained. Then, molecular dynamics (MD) simulations are performed for a series of zigzag SLGSs with different side-lengths and with various boundary conditions, the results of which are matched with those obtained by the nonlocal plate model to numerical the appropriate values of nonlocal parameter relevant to each type of boundary conditions.

Keywords : biaxial buckling, single-layered graphene sheets, nonlocal elasticity, molecular dynamics simulation, classical plate theory

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