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Thermo-mechanical Behavior of Functionally Graded Graphene Nanoplatelets Reinforced Composite (FG-GPLRC) Structures

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Graphene and its derivatives such as graphene nanoplatelets (GPLs) are widely used as reinforcing nanofillers to develop high performance polymer nanocomposites with significantly improved mechanical properties by making use of the extraordinary properties of graphene reinforcements while keeping the beneficial attributes of polymers such as large deformation, stretchability, and good chemical/biological compatibilities. Functionally graded materials (FGMs) are characterized by smooth and continuous change in both material composition and mechanical properties to simultaneously meet different performance requirements. Introduction of FGM concept into graphene based nanocomposites in which graphene nanofillers are non-uniformly dispersed in the matrix provides a wealth of opportunities for the development of novel functionally graded graphene reinforced polymer composites with tremendous potential applications in various engineering sectors. This talk deals with (i) the modified micromechanics model and molecular dynamics simulation for the determination of effective thermo-mechanical material properties, and (ii) thermo-mechanically induced bending, buckling and postbuckling behaviours of FG-GPLRC plates, with a particular focus on the effects of GPL weight fraction, distribution pattern, geometry, and vacancy defects on the thermo-mechanical performance of such structures.