Thermal buckling and post-buckling of laminated composite plates with temperature dependent properties by an asymptotic numerical method

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This paper presents a methodological approach based on the homotopy and perturbation methods for thermal buckling and post-buckling analyses of the anisotropic laminated plates with temperature dependent properties. A power law distribution in terms of temperature is used and the structure is subjected to a uniform temperature variation. A mathematical formulation that may account for various temperature dependent models is elaborated. Power series expansions of the displacement and the temperature are developed and the finite element method is used for numerical solutions. The critical buckling load and the post-buckling equilibrium path of plates under thermal loading are investigated. The effects of temperature dependent properties, structure geometry and boundary conditions on the thermal buckling and post-buckling behaviours are evaluated through parametric studies.

Keywords: thermal buckling and postbuckling/finite element method/homotopy method/laminated composite plate/temperature-dependent properties.