

عنوان مقاله:

Thermal Stability of Thin Rectangular Plates with Variable Thickness Made of Functionally Graded Materials

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خلاصه مقاله:

In this research, thermal buckling of thin rectangular plate made of Functionally Graded Materials (FGMs) with linear varying thickness is considered. Material properties are assumed to be graded in the thickness direction according to a simple power law distribution in terms of the volume fractions of the constituents. The supporting condition of all edges of such a plate is simply supported. The equilibrium and stability equations of a FGM rectangular plate (FGRP) under thermal loads derived based on classical plate theory (CPT) via variational formulation, and are used to determine the pre-buckling forces and the governing differential equation of the plate. The buckling analysis of a functionally graded plate is conducted using; the uniform temperature rise, having temperature gradient through-the-thickness, and linear temperature variation in the thickness and closed-form solutions are obtained. The buckling load is defined in a weighted residual approach. In a special case the obtained results are compared by the results of functionally graded plates with uniform thickness. The influences of the plate thickness variation and the edge ratio on the critical loads are investigated. Finally, different plots indicating the variation of buckling load vs. different gradient exponent k , different geometries and loading conditions were obtained.

کلمات کلیدی:

Thermal buckling, FGM plates, Thin rectangular Plate, Classical plate theory, Variable thickness plate, Galerkin Method

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