Thermomechanical Bending Response of Functionally Graded Nonsymmetric Sandwich Plates

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The thermomechanical bending response of nonsymmetric sandwich plates of uniform thickness (constant depth) is studied. A power-law distribution for the mechanical characteristics is adopted to model the continuous variation of properties from those of one component to those of the other. The nonsymmetric sandwich plate faces are made of isotropic, two-constituent (ceramic—metal) material distribution through the thickness. The core layer is still homogeneous and made of an isotropic metal material. The modulus of elasticity, Poisson's ratio of the faces and the thermal expansion coefficient are assumed to vary according to a power law distribution in terms of the volume fractions of the constituents. Several kinds of nonsymmetric sandwich plates are presented. Field equations for functionally graded nonsymmetric sandwich plates whose deformations are governed by either the shear deformation theories or the classical theory are derived. Displacement and stress functions of the plate for different values of the power-law exponent and thickness-to-side ratios are presented. The results of the shear deformation theories are compared together. Numerical results for deflections and stresses of functionally graded metal—ceramic plates are investigated.

Key Words: thermomechanical bending response • functionally graded material • nonsymmetric sandwich plate • sinusoidal theory.

This version was published on January 1, 2010

Journal of Sandwich Structures and Materials, Vol. 12, No. 1, 7-46 (2010)
DOI: 10.1177/1099636209102264