عنوان مقاله:

Buckling Behaviors of Symmetric and Antisymmetric Functionally Graded Beams

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خلاصه مقاله:

The present study investigates buckling characteristics of both nonlinear symmetric power and sigmoid functionally graded (FG) beams. The volume fractions of metal and ceramic are assumed to be distributed through a beam thickness by the sigmoid-law distribution (S-FGM), and the symmetric power function (SP-FGM). These functions have smooth variation of properties across the boundary rather than the classical power law distribution which permits gradually variation of stresses at the surface boundary and eliminates delamination. The Voigt model is proposed to homogenize micromechanical properties and to derive the effective material properties. The Euler- Bernoulli beam theory is selected to describe Kinematic relations. A finite element model is exploited to form stiffness and buckling matrices and solve the problem of eignivalue numerically. Numerical results present the effect of material graduations and elasticity ratios on the buckling behavior of FG beams. The proposed model is helpful in stability of mechanical .systems manufactured from FGMs

کلمات کلیدی:

Static Stability; Buckling; Functional graded materials; Symmetric Power-Law; Sigmoid Function; Finite Element