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Abstract

Based on the nonlocal strain gradient theory (NLSGT), and various higher order shear deformation beam theories a formulation for buckling and free vibration of size dependent functionally graded sandwich micro-beams resting on two parameter elastic foundation including Winkler and Pasternak shear layer springs with thermal effects is presented. The sandwich FG micro-beams are assumed to be formed with homogenous ceramic core and ceramic-metal FG skins. According to the Mori-Tanaka homogenization scheme and the classical rule of mixture the material properties of the FG part of the sandwich size dependent beam changes continuously through the thickness of the beam. Equations of motion and the associated boundary conditions are derived via Hamilton's principle. Static buckling loads and natural frequencies are obtained by using generalized differential quadrature method (GDQM) for size dependent sandwich FG beam with different boundary conditions. As original contributions to the literature, the effects of the nonlocal parameter (ea), the length scale parameter (l_m), aspect ratio (L/h),gradient index (k), different cross-section shapes, temperature change (ΔT) and stiffnesses of Winkler and shear layer springs (K_W , K_S respectively) on the buckling and free vibration of the sandwich FG micro-beam are

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