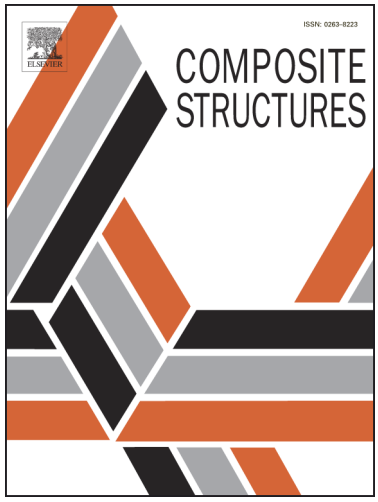

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Isogeometric analysis for nonlinear thermomechanical stability of functionally graded plates

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Abstract

Equilibrium and stability equations of functionally graded material (FGM) plate under thermal environment are formulated in this paper based on isogeometric analysis (IGA) in combination with higher-order shear deformation theory (HSDT). The FGM plate is made by a mixture of two distinct components, for which material properties not only vary continuously through thickness according to a power-law distribution but also depend on temperature. Temperature field is assumed to be constant in plate surfaces and uniform, linear and nonlinear through plate thickness, respectively. The governing equation is in nonlinear form based on von Karman assumption and thermal effect. A NURBS-based isogeometric finite element formulation is capable of naturally fulfilling the rigorous C^1-continuity required by the present plate model. Influences of gradient indices, boundary conditions, temperature distributions, material properties, length-to-thickness ratios on the behaviour of FGM plate are discussed in details. Numerical results demonstrate excellent performance of the present approach.

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