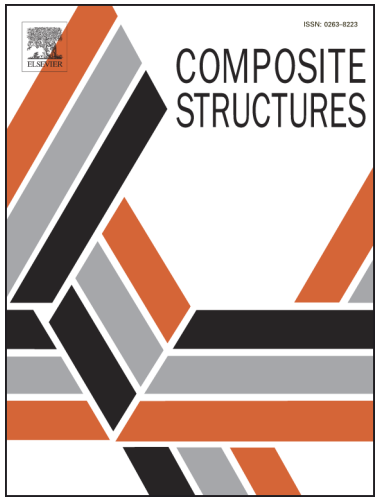

Hermite-Lagrangian finite element formulation to study functionally graded sandwich beams

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Hermite-Lagrangian finite element formulation to study functionally graded sandwich beams

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Abstract This paper presents a static analysis of functionally graded single and sandwich beams by using an efficient 7DOFs quasi-3D hybrid type theory. The governing equations are derived by employing the principle of virtual works in a weak form and solved by means of the Finite Element Method (FEM). A C^1 cubic Hermite interpolation is used for the vertical deflection variables while C^0 linear interpolation is employed for the other kinematics variables. Convergence rates are studied in order to validate the finite element technique. Numerical results of the present formulation are compared with analytical and FEM solutions available in the literature.

Keywords: Layered structures; Elasticity; Finite element analysis (FEA).

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1. Introduction

Functionally graded materials (FGMs) are advanced composite materials, in which each constituent material varies gradually over one or more directions. The material properties of FGMs vary continuously, which allows avoiding abrupt changes in the stress and displacement distributions. This particular feature distinguishes them