A simple and accurate generalized shear deformation theory for beams

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Abstract

This paper presents a static analysis of functionally graded (FG) single and sandwich beams by using a simple and efficient 4-unknown quasi-3D hybrid type theory, which includes both shear deformation and thickness stretching effects. The governing equations and boundary conditions are derived by employing the principle of virtual works. Navier-type closed-form solution is obtained for several beams. New hybrid type shear strain shape functions for the inplane and transverse displacement were introduced in general manner to model the displacement field of beams. Numerical results of the present compact quasi-3D theory are compared with other quasi-3D higher order shear deformation theories (HSDTs).

5 Figures