BENDING OF FUNCTIONALLY GRADED SPHERICAL SHELLS

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Abstract

The bending behavior of functionally graded spherical shells with a cutout is studied using the finite element method based on a higher-order shear deformation theory. The higher-order shear deformation theory is derived by assuming that the transverse displacement is constant through the thickness of the shell. Material properties are assumed to be graded in the thickness direction according to a simple power law distribution in terms of the volume fractions of the constituents. An eight-noded degenerated isoparametric shell element is considered with nine degrees of freedom at each node. The element stiffness matrix and load vector are derived using the principle of minimum potential energy. The formulation and the programme code are validated by comparing the results with those available in the literature. Results are presented for the variation of deflection and stresses in functionally graded spherical shell cap with a circular cutout with simply supported and clamped boundary conditions subjected to uniform normal pressure..

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