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Accurate buckling solutions of grid-stiffened functionally graded cylindrical shells under compressive and thermal loads

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Abstract

Buckling behaviors of shear deformable grid-stiffened functionally graded cylindrical shells are investigated under the combined compressive and thermal loads. The governing equations are established on the basis of Reddy's higher-order shear deformation theory. For the perfect grid-stiffened cylindrical shells, separation of variables is employed to obtain the accurate buckling solutions. Then, according to the derived mode functions, Galerkin's solving procedure is conducted for shells including the initial geometric imperfection. The effects of geometric parameters, properties of FGMs and temperature fields on the anti-buckling performances of grid-stiffened shells are concerned under the clamped boundary condition. Besides, imperfection sensitivities for various reinforced grids are discussed in detail.

Keywords: A. Ceramic-matrix composites (CMCs); B. Buckling; B. Thermal properties; C. Analytical modeling; Grid-stiffened cylindrical shell

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