

Nonlinear Free Vibrations of Functionally Graded Cylindrical Shells

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Abstract : Using a modal expansion that satisfies the boundary and continuity conditions and expresses the modal couplings characteristic of cylindrical shells in the nonlinear regime, the equations of motion are discretized using the Galerkin method. The resulting algebraic equations are solved by the Newton-Raphson method, thus obtaining the nonlinear frequency-amplitude relation. Finally, a parametric analysis is conducted to study the influence of the geometry of the shell, the gradient of the functional material and vibration modes on the degree and type of nonlinearity of the cylindrical shell, which is the main contribution of this research work.

Keywords : cylindrical shells, dynamics, functionally graded material, nonlinear vibrations

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