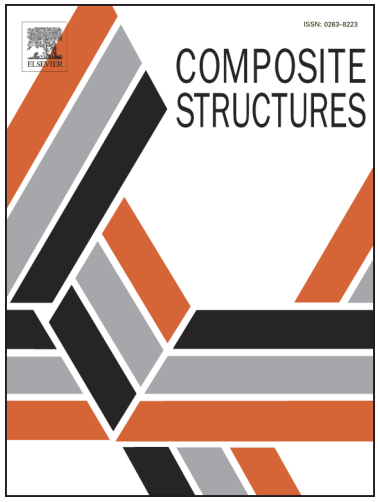

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Non-Linear Vibration Analysis of Laminated Composite Circular Cylindrical Shells

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Abstract

The non-linear transverse dynamic response of laminated composite simply supported circular cylindrical shell subjected to periodic radial point loading and static axial partial loading is studied in this paper considering von Kármán type of non-linearity. The applied partial edge loading is represented by Fourier series and the exact prebuckling stress distribution within the cylindrical shell is computed by solving the in-plane elasticity problem. Donnell's shell theory incorporating first order shear deformation, in-plane and rotary inertia is used to model the cylindrical shell. Galerkin's method is used to reduce the governing partial differential equations to a set of non-linear ordinary differential equations. These equations are solved using Incremental Harmonic Balance (IHB) method to obtain frequency-amplitude responses for free and forced vibration. The numerical results illustrate the effects of number of layers, static partial preloading, and initial geometric imperfections on the non-linear forced vibration of laminated composite cylindrical shells.

Keywords: Composite Cylindrical Shell, Non-linear Vibration, Geometric Imperfection, Backbone Curve, Frequency-Amplitude Response.

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