Analysis of Dynamic Stability of Fiber-Reinforced Laminated Cylindrical Shells Subjected to Periodic Hydrostatic Pressure

by

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Abstract

This paper deals with the problem of the dynamic stability of fiber-reinforced laminated cylindrical shells subjected to static and periodic hydrostatic pressure. First, the axially symmetric motion of the shell under loading is determined. Subsequently, certain perturbations are superimposed on this motion, and their behavior with respect to time is investigated. The symmetric state of the motion of the shell is called stable if the perturbations remain bounded. The solutions for the prebuckling motion and the perturbated motion are obtained by means of Galerkin's method. Stability regions are examined by utilizing Mathieu's equation. The inevitability of dynamically unstable behavior is proved analytically and the effects of various factors, such as the configuration parameter, the vibration amplitude and the dynamic unstable mode, are clarified.

Keywords: *Structural analysis, Composite laminated cylindrical shell, Dynamic stability, Periodic hydrostatic pressure, Mathieu's Equation*

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