Natural vibrations of anisotropic plates with several internal line hinges

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Abstract:

This paper deals with the free transverse vibration of anisotropic plates with several arbitrarily located internal line hinges and piecewise smooth boundaries, elastically restrained against rotation and translation. The equations of motion and the associated boundary and transition conditions are derived using Hamilton's principle in a rigorous framework. A new analytical manipulation based on a condensed notation is used to compact the corresponding analytical expressions. A combination of the Ritz method and the Lagrange multipliers method with polynomials as coordinate functions is used to obtain tables of the nondimensional frequencies and the corresponding mode shapes, for rectangular plates with different boundary conditions and restraint conditions in the internal line hinges. The cases not previously treated of two- and three line hinges are particularly analyzed.

Keywords: Rectangular Plate, Frequency Parameter, Natural Vibration, Lagrange Multiplier Method, Internal Line.