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Abstract

The current work deals with the assessment of dynamic stability behavior of laminated composite and sandwich plates subjected to in-plane static and periodic compressive loads based on a recently developed zigzag theory by the authors. This theory satisfies the traction-free boundary conditions at top and bottom surfaces of the laminate as well as the inter-laminar stress continuity at layer interfaces. Also, it obviates the need of artificial shear correction factor. The theory is based upon shear strain shape function assuming non-linear distribution of transverse shear stresses**.** An efficient C^0 continuous, eight-noded isoparametric element with seven field variable is employed for the dynamic stability analysis of laminated composite and sandwich plates. The boundaries of principal instability domains are obtained following Bolotin's approach and are represented either in the non-dimensional load amplitude-excitation frequency plane or load amplitude-load frequency plane. A series of numerical examples on the dynamic stability analysis of laminated composite and sandwich plates are studied to demonstrate the effects of modular ratio, span to thickness ratio, boundary conditions, thickness ratio, static load factor and various load parameters on the principal instability regions. The predicted results are compared with the available existing results in order to ensure the performance of the proposed model.

Keywords: Dynamic instability; Zigzag theory; Finite element method; Laminated composite; Sandwich plate

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