

عنوان مقاله:

Flutter & Divergence Based Optimization of Laminated Composite Plates under Combined Loadings

محل انتشار:

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خلاصه مقاله:

Dynamic stability behavior of laminated simply supported plates under conservative boundary traction loads are investigated in this study. Designation of such plates as function of layup configuration, plate aspect ratio, loading combinations, and layup thickness can be done with the aim of maximizing the critical stability loading capacity regarding flutter frequency value constraint. Optimization of laminated composites with maximizing the buckling load capacity regarding a stable dynamic behavior can be used in spacecraft structures and aerospace applications. Laminates used are in angle-ply mode and symmetric to mid-plane surface. Dynamic equilibrium of generated PDE has been solved using kernel integral transformation for modal frequency values and eigenvalue-based orthogonal expansions for critical stability loads. As shown in this investigation, main mode of dynamic stability of such structures is flutter or divergence that depends on stiffness distributions of composite plates. Results can help designers to shift the dynamic instability mode of composite plates by selecting an optimized layup orientation and thickness for a prescribed loading combination and geometry. Solution of presented mechanical problem has been done using analytical approach combined with penalty-based optimization algorithm and verified by FEA approach. The stability zones of plates and their optimized case are stated as final results.

کلمات کلیدی:

;Laminated Composite; Flutter; Divergence; Optimization; Analytical; FEA; Load Combination

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