

Parametric Study on Dynamic Analysis of Composite Laminated Plate

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Abstract : A laminated plate composite of graphite/epoxy has been analyzed dynamically in the present work by using a quadratic element (8-node iso-parametric), and by depending on 1st order shear deformation theory, every node in this element has 6-degrees of freedom (displacement in x, y, and z axis and twist about x, y, and z axis). The dynamic analysis in the present work covered parametric studies on a composite laminated plate (square plate) to determine its effect on the natural frequency of the plate. The parametric study is represented by set of changes (plate thickness, number of layers, support conditions, layer orientation), and the plates have been simulated by using ANSYS package 12. The boundary conditions considered in this study, at all four edges of the plate, are simply supported and fixed boundary condition. The results obtained from ANSYS program show that the natural frequency for both fixed and simply supported increases with increasing the number of layers, but this increase in the natural frequency for the first five modes will be neglected after 10 layers. And it is observed that the natural frequency of a composite laminated plate will change with the change of ply orientation, the natural frequency increases and it will be at maximum with angle 45 of ply for simply supported laminated plate, and maximum natural frequency will be with cross-ply (0/90) for fixed laminated composite plate. It is also observed that the natural frequency increase is approximately doubled when the thickness is doubled.

Keywords : laminated plate, orthotropic plate, square plate, natural frequency (free vibration), composite (graphite / epoxy)

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