

Finite Element Analysis of Viscoelastic Composite Plates

Using Higher-Order Zigzag Displacement Field

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A finite element analysis for viscoelastic composite laminates has been carried out by using displacement field of efficient higher order plate theory. A modified shape functions have been applied to pass the proper bending and shear patch tests, and the solution converges to the exact one. The constitutive equation for viscoelastic materials which has the form of Boltzmann superposition integral is simplified by Laplace transform to improve both computational accuracy and efficiency. The numerical examples for graphite/epoxy GY70/339 material are presented to describe the viscoelastic responses like creep strain and relaxation stress which have good agreement with elastic solutions. The present research provides an efficient and accurate tool for analysis composite laminates with viscoelastic effect.

Keywords: Composite laminates, Finite element method, EHOPT, Viscoelastic, Laplace transformation.