Delamination Modeling and Assessment for Composite Laminated Plates using Particle Swarm Optimization (PSO)

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Abstract

This work reports on the finite element method and particle swarm optimization method (PSO) for modeling and identification of delamination in composite material. A first order shear deformation using nine nodded isoparametric quadratic element with a simple multiple delamination model is used to develop the finite element analysis procedure. Delamination is the most common failure mechanism in composite structures. These damage causes changes in the physical properties by reducing the stiffness of the structure which leads to changes in modal parameters such as the frequencies, mode shapes, and modal damping factors. Identify the presence of damage and assess its size and location from a few lower frequency modes in modal test is the main objective of this study. Particle Swarm Optimization delamination detection based on the utilization of the changes in modal parameters as the objective function successfully identify the presence, location, and relative area size in composite laminated plates.

References


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Index Terms

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Keywords

composite laminates, Vibration Monitoring, Delamination, Damage Detection, Structural Health Monitoring, Finite element analysis