

Active Control of Damaged Composite Structure Using Piezoelectric Actuator and Sensor

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Laminated composite Structure, which has inherent great specific stiffness and strength, can be used in light-weight structural component. However, the complexity of failure mode of the laminated composite structure limits its commercial application. Delamination is one of the major failure modes of the laminated composite structure and delamination can degrades structural performance of a laminated composite structure. In this work, active control algorithm is adopted to reduce the delamination effects on composite structure and its performances are numerically investigated. Finite element model of delaminated composite structure is established based on improved layerwise theory and constitutive equations of piezoelectric actuator and sensor are included in the model. Active controller is also designed and implemented to the system model. Structural performances with and without active control algorithm are evaluated and it is observed that delamination effects can be effectively reduced down by adopting active control algorithm.

Keywords: Composite Structure, Delamination, Active Control, Piezoelectric Actuator / Sensor