

Initial delamination detection of fiber reinforced composite via electrical based method using electrode network

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Abstract

Delamination damage is common in fiber reinforced composite structures. In this paper, a delamination damage detection method based on electrical resistance measurement using an electrode network was proposed. Two different electrode networks were proposed to detect and localize delamination of composite laminate. Three-dimensional finite element modeling and analysis were performed to validate the effectiveness of the proposed electrode network method. The effect of delamination location and material electric anisotropy on the detection sensitivity is studied. The simulation results show that the proposed electrode network can be used for detecting inner delamination damage of composite laminates. However, delamination damage in the middle of the composite through thickness direction is more difficult to be detected compared with that near the top and bottom surfaces of the composite laminate. Detection sensitivity can be improved by decreasing the electric anisotropy ratio.

Keywords: Delamination detection; Composite; Electrical resistance method; Electrode network