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TITLE: DAMAGE ASSESSMENT OF COMPOSITE STRUCTURES USING ELECTROMECHANICAL IMPEDANCE METHOD

ABSTRACTS

In this paper results of application of electromechanical impedance (EMI) method for damage assessment in composite materials were presented. Object of investigation was a glass fibre reinforced polymer (GFRP) sandwich structure with honeycomb core, stiffeners and bonded joints. The EMI method is takes advantage electrical parameters of a piezoelectric transducer that is either bonded on the structure or embedded inside it. Due to electromechanical coupling of the transducer with the structure, mechanical resonances of structure can be seen in spectra of electrical characteristic of the piezoelectric transducer. Authors investigated the problem of damage assessment using EMI method under the influence of varying temperature. The studies were focused on the composite materials. Authors investigated both the influence of changing temperature and the influence of damage on resistance spectra gathered at the transducer. Results showed that temperature compensation is needed for the purpose of damage detection. Authors proposed temperature compensation algorithm based on signal correlation. Composite materials especially with sandwich structure are characterised by large material damping which could be a problem in the field of damage assessment. Due to the fact of large damping, the damage sensitive area for EMI method could be strongly reduced. This problem was also investigated in the conducted research.

KEYWORDS

Electromechanical impedance | Composites | Damage assessment |