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Low cost technique for detecting adhesive debonding damage of glass epoxy composite plate using an impedance based non-destructive testing method

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Abstract

In general, components in composite structures are usually achieved with adhesive bonding, a preferred choice over a conventional mechanical fastening approach. For this reason, debonding of an adhesive layer can be a serious problem as the reliability of the overall structure is influenced by its adhesion characteristics. In addition due to the fact that composites can be formed into various shapes and sizes with ease, this creates a challenging problem for the non-destructive testing (NDT) methods when detecting damage. In this study, a relatively new contact NDT method known as the electromechanical impedance method is used to detect adhesive debonding of glass epoxy composite plates. Furthermore, a metal wire concept is utilized to monitor up to three composite plates using a single impedance measuring device. To achieve this, various piezoelectric transducers are cut into different sizes and connected in series. The results from the experiments introduced in this study shows promising outcome which opens up new possibilities in the field of NDT.

Keywords: Adhesive defect; piezoelectric; debonding; structural health monitoring; non-destructive testing

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