

A STOCHASTIC NDT METHOD FOR DAMAGE IDENTIFICATION AND PREDICTIVE MODELING FOR MECHANICAL PROPERTIES DEGRADATION DUE TO NOTCH EXISTANCE IN COMPOSITE MATERIALS

ABSTRACT

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Unlike conventional metallic materials, composite structures fail under different failure modes. The initiation of the damage does not mean that the structure cannot carry any additional load. The residual load bearing capability of the composite structure from the onset of material failure or initiation of damage to final failure can be quite significant. Therefore, it is important to understand the damage initiation and progression in composite structures subjected to combined loading conditions. A cumulative procedure of damage generation is observed which, in turn, results in material property degradation.

In the present paper, a vibrational NDT method along with Stochastic Pooled modelling was used for the damage identification due to the existence of edge notches in certain composite materials. Experiments were executed in a series of GFRP composites. Next, the Residual Properties Model (RPM) was applied in order to predict the mechanical properties degradation with the notch length. Finally, theoretical predictions were compared with respective experimental findings and respective damages were correlated with predicted material property values.