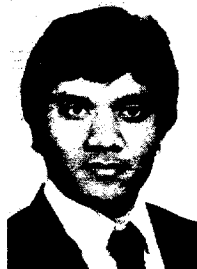


Physically Based Ultrasonic Feature Mapping for Anomaly Classification in Composite Materials

by J. B. Nestleroth, J. L. Rose, M. Bashyam, and K. Subramanian



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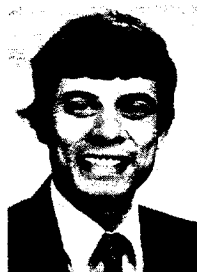


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Abstract

Composite materials often contain anomalies that either come about during the fabrication process or develop during the service life of the structure. Some anomalies greatly reduce the strength of the material whereas others do not impose significant limitations on structural performance. Identification of these anomalies is often possible by employing ultrasonic feature mapping (F-map) techniques. In the F-map process, detection of anomalies is performed by observing

either a change in signal amplitude by traditional C-scan analysis, or by noting changes in the feature value of a back-wall echo or in a through-transmission signal. Identification is then accomplished by examining features that are developed by using physical models that describe the interaction between anomaly geometry and ultrasonic wave propagation. Photomicrographs are used in the development of a physical model and in the confirmation of anomaly type and definition. Identification procedures using the ultrasonic F-map process are presented for three common anomaly types. The F-maps and location results were generated with a color graphics terminal.