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Detection of Impact Damage in Composites Under Complex Environment Using Guided Waves

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This paper presents an experimental study on detection of impact damage in composites under complex environment using guided waves. An experimental set-up consisting of an electrical oven, a MTS testing machine and a monitoring system is established to perform the study. First, the combined effects of temperature, load and vibration on the propagation of guided waves in a composite coupon is studied. Then, a statistical approach is proposed to detect impact damage under these combined effects. Damage feature is extracted after the guided wave signals are processed by wavelet transform. A Monte Carlo procedure is employed to estimate the probability density functions (PDFs) of the feature before and after damage, respectively. By comparing the PDFs, the probability of existence of impact damage is determined. Experimental study on a composite coupon under combined effects of temperature, load and vibration is conducted to demonstrate the effectiveness of the proposed method.

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Ключевые слова:

Содержание

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Environmental effects
Statistical damage detection approach
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