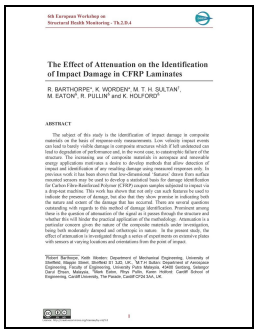

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The Effect of Attenuation on the Identification of Impact Damage in CFRP Laminates

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The subject of this study is the identification of impact damage in composite materials on the basis of response-only measurements. Low velocity impact events can lead to barely visible damage in composite structures which if left undetected can lead to degradation of performance and, in the worst case, to catastrophic failure of the structure. The increasing use of composite materials in aerospace and renewable energy applications motivates a desire to develop methods that allow detection of impact and identification of any resulting damage using measured responses only. In previous work it has been shown that low-dimensional 'features' drawn from surface mounted sensors may be used to develop a statistical basis for damage identification for Carbon Fibre-Reinforced Polymer (CFRP) coupon samples subjected to impact via a drop-test machine. This work has shown that not only can such features be used to indicate the presence of damage, but also that they show promise in indicating both the nature and extent of the damage that has occurred. There are several questions outstanding with regards to this method of damage identification. Prominent among these is the question of attenuation of the signal as it passes through the structure and whether this will hinder the practical application of the methodology. Attenuation is a particular concern given the nature of the composite materials under investigation, being both moderately damped and orthotropic in nature. In the present study, the effect of attenuation is investigated through a series of experiments on extensive plates with sensors at varying locations and orientations from the point of impact.

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Ключевые слова:

Содержание