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RESONANT TECHNIQUES AS NON-DESTRUCTIVE TECHNIQUES (NDT) APPLIED TO COMPOSITE MATERIALS: CASE STUDY ON LOW VELOCITY IMPACTS DETECTION

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Abstract

Impact damage is considered the primary cause of in-service delamination in composite materials and promotes significant reduction in residual strength. Non-destructive techniques (NDT) include several methods able to detect the shape and the size of the interior damages without destruction of the structure or component, which is economically advantageous. The aim of this paper is to evaluate the properties after low velocity impacts using an experimental-numerical procedure based on the resonant frequencies. Experimental tests were carried out on $[0_i, 90_i]_s$ ($i=2, 3, 4$) laminates and the C-Scan technique was used to characterize the internal damage after impact.

The resonant technique was applied before and after impact tests, in order to observe the effect of delamination on resonant frequencies. However, the delaminations experimentally observed by C-scan technique were found to have a limited effect on the resonant frequencies. The delaminations deteriorate the composite matrix but its global rigidity is mainly determined by the fibres.

Key words: composite laminates, impact loads, resonant techniques

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