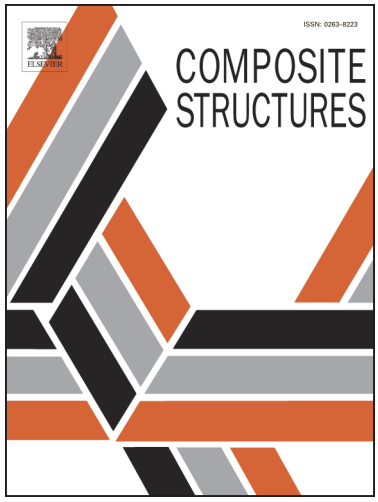

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Experimental and numerical investigation into the influence of stacking sequence on the low-velocity impact response of new 3D FMLs

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1. Abstract

The present study investigates, both experimentally and computationally, influence of the stacking sequence on the low-velocity impact response of a new fiber metal laminated (FML) concept, formed with magnesium alloy sheets and a new class of true 3D fiberglass fabric (3DFGF). Two different thicknesses of the 3DFGF and four different configurations of FMLs are considered. In particular, the stiffness, strength, energy absorption and failure modes of these configurations of FMLs against impact are compared. To make the comparison unbiased, the impact capacities of FMLs are normalized with respect to their weight and cost, which are the two significant parameters that govern the selection of design of mechanical systems. In addition to the experiments, a finite-element model is constructed using the commercial finite-element code ABAQUS/Explicit, in conjunction with its VUMAT facility, to analyze the impact response of the FMLs. Good agreements between the experimental and computational results are obtained, demonstrating that the model can be used to predict the response of such FMLs and further optimize the configuration and response of such sophisticated systems.

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