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HIGH VELOCITY IMPACT BEHAVIOUR OF HYBRID BASALT-CARBON/EPOXY COMPOSITES

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ABSTRACT

The aim of this work is to investigate the effect of basalt fibre hybridization on carbon/epoxy laminates when subjected to high velocity impacts. In this regard, interply hybrid specimens with four different stacking sequences (sandwich-like and intercalated structures) are tested and compared to non-hybrid reference laminates made of either only carbon or only basalt layers. The response to high velocity impact tests is assessed through the evaluation of the impact and residual velocities of the projectile and the ballistic limit, calculated using experimental data, is compared with the results given by an analytical model, showing a good agreement. The damage in composite laminates is investigated by destructive (optical microscopy) and non-destructive (ultrasonic phased array) techniques.

As a result of basalt hybridization, the ballistic limits of all sandwich configurations are enhanced if compared to those of carbon laminates. Therefore the observed decrease of static mechanical properties of hybrid composites is largely compensated by improved response to impact. Advantages also come in terms of cost saving, since the basalt fibre is far less expensive than the carbon one.

Keywords: High velocity impact; hybrid composites; basalt fibres

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