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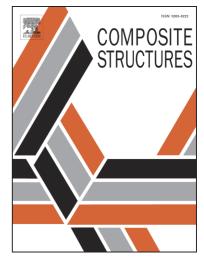
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ACCEPTED MANUSCRIPT

Design and characterisation of advanced pseudo-ductile unidirectional thin-ply carbon/epoxy-

glass/epoxy hybrid composites

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Abstract

A comprehensive set of thin-ply pseudo-ductile unidirectional interlayer hybrid composite materials comprising S-glass and a variety of thin carbon prepregs was designed and characterised. Unique elastic-yielding-hardening type stress-strain responses similar to those of ductile metals were achieved through fragmentation and stable pull-out of the carbon layers, generating a range of initial moduli, pseudo-yield strains, plateau stresses and pseudo ductile strains for the various configurations. The typical failure modes of thin-ply hybrid composites were highlighted in four series of stress-strain graphs obtained for the same materials with different carbon layer thicknesses. The predicted failure modes agreed well with the experimental results and demonstrated the merit of our two step design framework based on (f) simple analytical criteria and (ii) novel damage mode maps.

Keywords:

Pseudo-ductility; Thin-ply composites; Fragmentation; Delamination; Damage and fracture mechanics; Mechanical testing;

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