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Orientation-dispersed pseudo-ductile hybrid composite laminates – A new lay-up concept to avoid free-edge delamination

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Abstract

Multi-Directional hybrid composites can suffer from free-edge delamination, a damage mode that doesn't exist in Uni-Directional hybrid composites and can hinder the pseudo-ductility that can be achieved with thin-ply hybrids. This paper presents a new lay-up concept called '*orientation-dispersed*' laminates to avoid this mode of damage in quasi-isotropic hybrids. It is shown that the energy release rates at the free-edges of orientation-dispersed layups are significantly lower than those in '*orientation-blocked*' laminates. Finally, the experimental results from two quasi-isotropic layups with π/3 and π/4 intervals are presented showing a good pseudo-ductility with no free-edge delamination.

Keywords:

A. Hybrid composites, B. Fragmentation, B. Non-linear behaviour, B. Stress/strain curves, C. Finite element analysis (FEA)