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Translaminar fracture toughness of discontinuous, aligned flax fibre composites

Absract

This paper describes the results of an investigation into Mode I translaminar critical strain energy release rate of continuous laminates and slit-cut laminates. The aims of the work were to define the fracture properties of flax-epoxy prepreg laminates for component design and to investigate the active fracture mechanisms. Compact tension tests were performed using cross ply unidirectional laminates, one with continuous 0° plies and one with slit cuts in the 0° plies. The behaviour of the material observed during the test revealed a lower initiation critical energy release rate for the discontinuous laminates. The R-curve was only established for the discontinuous laminates and showed a rising behaviour due to bridging of the interfaces. It was found that different fracture mechanisms acted in the two laminates, single fibre pull-out was observed in the continuous laminates and bundle pull-out was observed in the discontinuous laminates.

Keywords

Discontinuous fibre; Flax; Flax-epoxy prepreg; Strain energy release (Gc); Translaminar