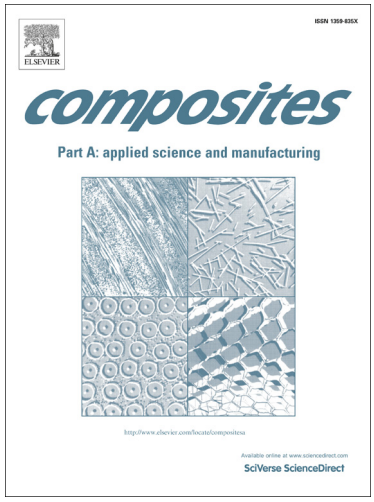

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The effect of fibre dispersion on initial failure strain and cluster development in unidirectional carbon/glass hybrid composites

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Abstract

By adding glass fibres to carbon fibre composites, the apparent failure strain of the carbon fibres can be increased. A strength model for unidirectional hybrid composites was developed under very local load sharing assumptions to study this hybrid effect. Firstly, it was shown that adding more glass fibres leads to higher hybrid effects. The hybrid effect was up to 32% for a hybrid composite with a 10/90 ratio of carbon/glass fibres. The development of clusters of broken fibres helped to explain differences in the performance of these hybrid composites. For 50/50 carbon/glass hybrids, a fine bundle-by-bundle dispersion led to a slightly smaller hybrid effect than for randomly dispersed hybrids. The highest hybrid effect for a 50/50 ratio, however, was 16% and was achieved in a composite with alternating single fibre layers. The results demonstrate that thin ply hybrids may have more potential for improved mechanical properties than comingled hybrids.