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EFFECT OF FIBER SURFACE TEXTURE ON THE MECHANICAL PROPERTIES OF GLASS FIBER REINFORCED EPOXY COMPOSITE

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ABSTRACT

The effect of fiber sizing and surface texture on the strength and energy absorbing capacity of fiber reinforced composites has been evaluated at two length scales using the macromechanical quasi-static punch shear test and the micromechanical microdroplet test methods. E-Glass/SC-79 epoxy composite laminates with four different fiber sizing formulations with various degrees of chemical bonding and surface texture have been investigated. The failure modes during perforation and different energy dissipating damage mechanisms were identified and quantified. The punch shear strength and the total energy absorption per unit volume of composite with hybrid sizing have increased by 48% and 100% over the incompatible sizing. These results showed linear correlations with the interphase properties reported earlier by the authors [15] and provided a methodology for developing new sizing by tailoring chemical bonding and the fiber surface texture at the fiber-matrix interphase for improving both strength and energy absorption of composites.

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