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Impact Response of Electrorheological Fluid-Filled Composite Structure[#]

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Abstract: Low velocity impact tests have been undertaken on a series of silicone-based electrorheological fluid (ERF)-filled composite structures formulated with Kevlar®, Dyneema® and Carbon-reinforced epoxy laminates. The study is focused on demonstrating the effect of the fluid as an electric field-controlled constrained core, an energy absorbing medium or load support member, in fiber-reinforced composites. The drop tests were carried out at 7m/s under varied electric field of 0 – 5.0KV/mm from a voltage source. Having characterized the fluid as solids and the rheological data obtained with an electrorheometer, its performance is explained relative to structure. From the results, variations in characteristic responses revealed increased load bearing capability relative to increased applied electric field. Hence, the characteristics of the composite structures considerably depended on the rheological properties of the fluid.

Keywords: *Composites, Electrorheological fluid, Impact*

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