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The size dependence of tensile strength for brittle isotropic materials and carbon fiber composite materials

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ABSTRACT

The size scaling of strength is examined for isotropic materials and for aligned fiber composite materials. The theoretical work follows the Weibull chain of links probabilistic form for the one dimensional cases. The three dimensional, brittle isotropic material theoretical result combines the Weibull chain of links form with a fracture mechanics requirement. The verification procedure involves single T300 carbon fiber testing at different fiber lengths. The aligned fiber strand testing is for standard T300/epoxy composites at different lengths. The theoretical predictions for the size dependence of tensile strength are in reasonable agreement with the testing results.

Keywords:

A. Carbon fibers

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