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Advanced Beam Model for Fiber-Bridging in Unidirectional Composite Double-Cantilever Beam Specimens

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Linear beam analysis accounting for fiber-bridging in composite DCB specimen was carried out. A simple solver was written based on beam equations. The location and number of bridgings is required as input data. Experiments were made on unidirectional glass/polyester specimens. Initiation and propagation tests were conducted. Initiation test results show very good agreement with previous beam model predictions. In contrast based on propagation test data beam models seemed to be inappropriate for predicting both the specimen compliance and the fracture toughness. The contradiction was attributed to the fiber-bridging phenomenon. The bridging law was determined from experiment and also from beam analysis. Comparison between them shows good agreement. According to the beam analysis the number of bridging fibers and the total force exerted by the bridgings can approximately be predicted. These two parameters show similar behavior, i.e. exhibit a peak value and after a steady-state behavior.

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