

Fibers Microbuckling of Uncured Carbon-Epoxy Prepreg in Bending

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Abstract

Prepreg is widely used in composite manufacturing with advanced composites such as carbon and aramid. The material is characterized by a degree of flexibility (drape) and stickiness (tack), which allows an efficient layup on molds with complex shapes. However, axial instability of compressed fibers during the molding process may occur, potentially causing fiber microbuckling and wrinkling. The phenomenon could adversely affect manufacturing efficiency, product design and the quality of manufacturing laminates. This thesis will present semi-empirical estimations of fiber microbuckling, supported by experimental validation measuring the geometry of compressed fibers under bending. Results show that microbuckling wavelength predictions using Wang's theoretical model are in good agreement with experimental results. In addition, the limited bending capability of uncured carbon-epoxy prepreg without buckling or wrinkling on the compressed side is confirmed.

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