

Effects of braiding angle on damage mechanisms in SiC/SiC composite tubes characterized by X-ray computed tomography

The mechanical behavior of 2D-braided SiC/SiC composite tubes depends strongly on the braiding angle. Tubes of three different braiding angles (30°, 45°, 60°) have been observed during in situ tensile tests using synchrotron X-ray tomography.

In order to detect the slightly open cracks from heterogeneous microstructures, various image processing techniques have been used and developed. Digital Volume Correlation (DVC) allows the 3D displacement field within the material under loading to be estimated. The crack networks are extracted by a DVC-based image subtraction. The detected cracks are first classified into two groups according to their orientations, and then are characterized in qualitative and quantitative ways.

The crack analyses on the three different tubes provide not only a study on the braiding angle effects but also a better understanding on the damage mechanisms of the composite.

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