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Investigation on the Damage Behavior of 3D Woven Carbon-fiber Reinforced Composites

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Abstract

The damage evolution behavior of 3D woven carbon-fiber reinforced composites were studied by experimental methods and analytical models.

A non-destructively experimental method was proposed to realize the in situ study on the damage evolution of 3D woven carbon-fiber reinforced composites. The Synchrotron radiation computer tomography (SRCT) was adopted. The out-plane damage evolution behavior of 3D woven composites was presented. Moreover, a progressive damage model was developed to study the damage evolution behavior of 3D woven composites. A set of angle-dependent damage variables are introduced. In the analysis model, the fiber yarn fluctuation and fiber yarn distortion were considered to describe the realistic interlaced architecture of the 3D woven composites. The predicted failure strength and damage mechanisms are coincident with the corresponding experimental results.

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