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Abstract

Manufacturing of composite preforms by use of a programmed and controlled reinforcement spray deposition process presents itself as an attractive approach to produce short fiber reinforced composite structures. To predict properties of the final composite structure, simulations of the reinforcement deposition process are conducted to obtain the reinforcement orientation distribution. A micromechanics analysis incorporating the Mori–Tanaka method and texture tensors is used to predict the properties of the final consolidated composite parts. This processing–microstructure-property prediction scheme is applied to the analysis of composite structures in the carbon–carbon system. The effects of variations in reinforcement length in the spray deposited preform, and boundary effects as occurring in a near-net shape composite disk are discussed.

Keywords

Short fiber reinforced composite, Fiber deposition, Micromechanics, Graded materials, Near-net shape manufacturing