

Calculation of the Evolution of Surface Area and Free Volume During the Infiltration of Fiber Felts

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Abstract

The evolution of surface area and free volume during the infiltration of fiber felts is calculated quantitatively and compared with experimental data. For overlapping fibers the evolution is approximated by a Boolean model, where the ratio of surface area to free volume increases linearly with the radius of the fibers. For randomly distributed fibers which do not overlap in the initial state, the evolution of surface area and free volume is calculated numerically. The surface area/free volume ratio increases nearly linearly for all initial filling factors and for all degrees of orientation anisotropy of the fibers.

Key Words

Boolean model, carbon composites, chemical vapor infiltration, free volume, surface area.