

## Modelling of Composites Processing Using a Two-Phase Porous Media Theory

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A framework for the modeling of various forming processes for biphasic fiber composites is proposed. The class of processes considered involve deformation of a fiber bundle network, wetting by penetration of resin into fiber bundles, and resin flow through the fiber bundle network. The model framework comprises the continuum formulation of a nonlinear compressible porous solid saturated with a compressible fluid phase, which consists of liquid resin with dispersed gas. In particular, we are concerned with the modeling of fluid pressure driven wetting of liquid into the fiber-bundles. The wetting process is considered as an irreversible dissipative mechanism that leads to the compaction of solid phase due to the exclusion of voids and “elastic” packing of the fibers. Additionally, anisotropic macroscopic Darcian flow of the resin is accounted for. A finite element analysis creep test representing the press-forming processing of a polymer composite pressure vessel is demonstrated.

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