
Modeling the process of multilevel liquid binder filtration in a textile composite manufactured by RTM technology

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The article considers the mathematical model of a multilevel filtration process of liquid binder in a textile composite material manufactured by RTM technology. The model describes filtration process on the two structural levels: the macroscopic motion of the liquid binder on the frame of the composite structure and the motion of the binder within the individual cell of textile composite periodicity on a microscopic level. Both three-dimensional filtration problems are solved numerically using the finite element method. The presented results of numerical modeling the filtration process of the liquid binder in a textile material revealed characteristic features of the binder motion. The developed model of multilevel filtration may serve as a basis for the optimization of technological processes of manufacturing structural elements made of composite materials using the RTM technology.

Keywords: composites, multilevel filtration process, RTM method, asymptotic averaging method, periodicity cell, textile composite, finite element method, numerical simulation, pore pressure.

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