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A Finite Volume Solver for Non-Newtonian flow on Unstructured Grid with Application in Blood Flow GAOLING ZHOU, BIN CHEN, State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, Xi'an — In order to simulate blood flow in complex vessel, a finite volume solver for Casson fluid flow based on SIMPLE algorithm of Newtonian fluid on unstructured collocated grid is developed. For the discretization of convective fluxes and source term, it is similar with Newtonian fluid. For the discretization of diffusion fluxes, viscosity will take the value calculated from the flow field of previous iteration in order to avoid the complexity caused by the complicated viscosity expression as a function of shear rate. Then the discretization of momentum equation is similar with that of Newtonian fluid with variable viscosity and SIMPLE algorithm can be used to resolve the pressure-velocity coupling. Casson fluid flow through a symmetric sudden expansion channel is compared with literature and the good agreement between simulated velocity distributions with literature confirms the validation of present algorithm. Afterwards, blood flows in T-type bifurcation are simulated by our proposed algorithm. The simulation result of Casson fluid is more consistent with experiment than that of Newtonian fluid, which indicates that using Casson model to simulate on-Newtonian characteristics of blood is successful and necessary.

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