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PARALLEL NUMERICAL SIMULATION OF NON-NEWTONIAN BLOOD FLOWS

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We develop parallel numerical algorithms to simulate non-Newtonian blood flows, and compare with the results obtained using a Newtonian model. The high nonlinearity and the complex geometry make the problem challenging and parallel computing is necessary. The nonlinearities are not only due to the convection term but also the viscosity term since the viscosity of non-Newtonian flow is dependent on the shear-rate. In this work, we use the Galerkin/least squares finite element formulation for the spatial discretization, and the resulting large sparse nonlinear system of equations is solved by a Newton-Krylov-Schwarz algorithm. We present the results obtained by using the Newtonian and non-Newtonian models to investigate the non-Newtonian effect, and we also show the parallel performance of the proposed numerical algorithm.