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**Numerical Simulation of Cellular Blood Flow through a Rigid Artery** DANIEL REASOR, JONATHAN CLAUSEN, CYRUS AIDUN, Georgia Institute of Technology — In blood flow, red blood cells (RBCs), the most numerous constituent of blood, influence continuum-level measures by altering the suspension at microscopic scales. The presence of RBCs alters the stress and diffusion individual cells experience, which can influence cardiovascular diseases by affecting other cells present in blood like platelets and white blood cells. Simulations of blood at a cellular level provide a tool that allows exploration of both the rheology and the stress and diffusion of individual suspended cells. In this work, a hybrid lattice-Boltzmann/finite element method is used to simulate suspension flows characteristic of blood with deformable RBCs at realistic hematocrit values. We have shown the ability to simulate thousands deformable suspensions capturing non-Newtonian flow characteristics such as shear thinning, and the results agree well with experimental observations. Simulations through rigid arteries have been deformed with as many as 2500 RBCs. This work outlines results obtained for pressure-gradient driven blood flow through a rigid artery with 20%, 30%, 40%, and 50% hematocrit values. Results include the effect these deformable RBCs have on mean velocity, flow rate, radial variation of RBC concentration, and the effective viscosity for simulations at moderate to low cell capillary numbers, $Ca \leq 0.08$.

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