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Effect of Particle Deformation on Suspension Rheology using a Hybrid Lattice-Boltzmann – Finite Element Method[1] JONATHAN CLAUSEN, ROBERT MACMECCAN, CYRUS AIDUN, Georgia Institute of Technology — Many suspensions contain particles where the deformation of the solid phase significantly alters the behavior of the flow. In the present study, the effect of particle deformation on suspension rheology is quantified using a novel simulation technique which couples the lattice-Boltzmann method for the fluid phase to finite-element analysis for the solid phase. Simulations of three-dimensional deformable particles in simple shear are presented with emphasis on the effect particle deformation has on suspension rheology. Effective viscosity and normal stress differences are analyzed in high concentration suspensions of up to 400 particles. The results include simulation of red blood cells at physiologic concentrations and comparison to spherical capsules with similar material properties.

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