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The Role of Particle Deformation in the Rheology and Microstructure of Noncolloidal Suspensions JONATHAN CLAUSEN, DANIEL REASOR, CYRUS AIDUN, Georgia Institute of Technology — Particle deformation creates a marked effect on the rheology of noncolloidal suspensions. More pronounced non-Newtonian behavior such as shear-thinning and normal stress differences can be seen as compared with rigid particle suspensions. In this study, a lattice-Boltzmann-method fluid is coupled to a finite-element-method solid to simulate three-dimensional deformable particles. A Lees–Edwards boundary condition is implemented in the lattice-Boltzmann method, which allows the investigation of bulk suspension properties. Simulation results focus on shear viscosity and normal stress differences, as well as microstructure parameters such as the Taylor deformation index. Simulations of hundreds of three-dimensional deformable particles are presented in unbounded shear at concentrations up to 40%. Results include suspensions of solid elastic spheres, spherical capsules with elastic membranes, and model red blood cells.

Cyrus Aidun
Georgia Institute of Technology

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