

Abstract Submitted
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Simulation of viscoelastic suspensions using regularized singularities RONALD PHILLIPS, RYOTA AOKI, Chemical Engineering and Materials Science, UC Davis — Particles interacting through viscoelastic fluids exhibit behavior that differs qualitatively from corresponding systems with Newtonian suspending fluids. Depending on the type of fluid involved, the polymer contribution to the stress can induce clustering or particle chaining, and impede efforts to form a homogeneous suspension. We are using regularized singularities in conjunction with the finite volume method to calculate velocity fields, stress fields, and particle displacements in viscoelastic suspensions. These singularities consist of Stokelets and stresslets, or regions of enhanced body forces and stresses, and provide a simple model of suspensions of weakly deformable, non-neutrally buoyant particles. Simulations of hundreds of two-dimensional particles in multimode viscoelastic fluids show behavior similar to what is seen experimentally, and provide insight into the physical causes of particle aggregation in complex fluids.

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