

Abstract Submitted
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Kinematics, Shape Dynamics, and Rheology of Soft Particle Suspensions PHANI KANTH SANAGAVARAPU, Indian Institute of Science, Bangalore, GANESH SUBRAMANIAN, JNCASR, Bangalore, PRABHU NOTT, Indian Institute of Science, Bangalore — Fluid-structure interactions are ubiquitous in nature, finding applications in biology and engineering. Unlike rigid particles suspended in a fluid, deformable particles exhibit interesting shape dynamics when subjected to external flow fields [1]. Equally, the presence of small deformable particles in fluids can also significantly influence the rheological properties of the suspension [2]. We extend the analysis of Roscoe [2] from steady state to dynamics, as an alternative to the “stress polarization” technique used by Ref. [1]. Here, we present the influence of the externally imposed shear and axisymmetric extensional flows, the initial shape, orientation, and the elastic modulus of the particles on the shape dynamics of neo-Hookean elastic particles, and the rheology of the suspension. We consider initial orientations wherein the principal axis of the particle lies both in and out of the plane of the shear. [1] Gao, T., Hu, H. H., & Castañeda, P. P. (2012). Shape Dynamics and Rheology of Soft Elastic Particles in a Shear Flow. *Physical Review Letters*, 108, 058302. [2] Roscoe, R. (1967) On the rheology of a suspension of viscoelastic spheres in a viscous liquid. *Journal of Fluid Mechanics*, vol. 28, p.273-293.

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