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The hydrodynamic interaction of two small freely-moving particles in a Couette flow of a yield stress fluid[1] MOHAMMADHOSSEIN FIROUZNIA, Department of Mechanical Engineering, Ohio University, Athens, Ohio 45701-2979, USA, BLOEN METZGER, Aix-Marseille Universite, CNRS, IUSTI UMR 7343, 13453 Marseille, France, GUILLAUME OVARLEZ, University of Bordeaux, CNRS, Solvay, LOF, UMR 5258, 33608 Pessac, France, SARAH HORMOZI, Department of Mechanical Engineering, Ohio University, Athens, Ohio 45701-2979, USA — The flows of non-Newtonian slurries, often suspensions of non-colloidal particles in yield stress fluids, are ubiquitous in many natural phenomena and industrial processes. Investigating the microstructure is essential allowing the refinement of macroscopic equations for complex suspensions. One important constraint on the dynamics of a Stokesian suspension is reversibility, which is not necessarily valid for complex fluids. The interaction of two particles in a reversing shear flow of complex fluids is a guide to understand the behavior of complex suspensions. We study the hydrodynamic interaction of two small freely-moving spheres in a linear flow field of yield stress fluids. An important point is that non-Newtonian fluid effects can be varied and unusual. Depending on the shear rate, even a yield stress fluid might show hysteresis, shear banding and elasticity at the local scales that need to be taken into account. We study these effects with the aid of conventional rheometry, Particle Image Velocimetry and Particle Tracking Velocimetry in an original apparatus. We show our preliminary experimental results.

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