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Shear induced migration of particles in a yield stress fluid: experiment[1] SARAH HORMOZI, MOHAMMAD GHOLAMI, AHMADREZA RASHEDI, Ohio University, NICOLAS LENOIR, GUILLAUME OVARLEZ, Bordeaux University, CNRS — We have performed rheometry coupled with X-ray radiography in a narrow gap Couette cell filled with a suspension of spherical particles in a yield stress fluid. In this setup, the shear rate is discontinuous changing from a constant value in the gap to zero in the reservoir located at the top. This shear rate inhomogeneity results in the migration of particles from the gap to the reservoir, so-called Shear Induced Migration (SIM). The rheometry results give us insight into understanding the bulk rheology in the presence of shear rate and solid volume fraction inhomogeneities. In addition to that, our recent X-ray radiography technique (Gholami et al, JOR. 2017) provides detailed information about the evolution of the solid volume fraction in the domain. These measurements allow us to refine the recent continuum model frameworks (Hormozi Frigaard, JFM 2017) for SIM of particles in a yield stress suspending fluid. We show that complex rheology of the yield stress suspending fluid and formation of the islands of unyielded regions in the reservoir strongly affects the SIM of particles. This feature is absent when we deal with a Newtonian suspending fluid.

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