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Particle behavior in linear shear flow: an experimental and numerical study[1] NIMA FATHI, The University of New Mexico, MARC INGBER, University of Colorado - Denver, PETER VOROBIEFF, The University of New Mexico — We study particle behavior in low Reynolds number flows. Our experimental setup can produce both Couette flow and Pouseuille flow at low Reynolds numbers. Spherical particles are suspended in gravity-stratified Newtonian fluid. Their predominantly two-dimensional motion is driven by moving belts (and/or piston) that produce shear in the fluids. Particle migration and translational velocity have been studied. The irreversibility of particle motion has been investigated. The experimental results are compared to the numerical simulations performed with discrete phase element method (DPM). Particle trajectories with the same boundary conditions in viscous fluids have been studied. The irreversibility in numerical simulation has been modeled for different cases. Results show the particle migration is a function of shear rate, particle size, degree of symmetry of the fluid domain, and also of the initial starting position, the latter playing an important role in the irreversibility of particle motion.

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