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Tuning the hydrodynamic interactions between non-uniform sedimenting particles[1] KAVINDA NISSANKA, XIAOLEI MA, JUSTIN BURTON, Emory University — Sedimentation dynamics of non-Brownian particles with non-uniform density distributions have recently been shown to exhibit hyperuniformity (Goldfriend et al., Phys. Rev. Lett., 2017). These predictions are tested here experimentally using spheroidal particles. Particles are classified by two parameters, their aspect ratio κ and center of mass offset χ. They were created from 2mm diameter spheres glued in various configurations. Spheres of different densities are used to vary χ. We record the positions of particles using a high-speed camera, as they sediment in a quasi-2D tank at Re $= 10^{-3}$. Using tracking algorithms, we reconstruct the sedimentation trajectories. Pair interaction between particles is characterized by particle center separation vs. vertical distance traveled. Particles with $\kappa>1$ exhibit repulsive behavior, while particles with $\kappa<1$ attract each other. Interaction strength is shown to be inversely proportional to χ. For 3 or more simultaneously sedimenting particles, repulsive interactions lead to a more uniform distribution of particles positions, whereas attractive interactions lead to particle clustering.

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