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Particle Dynamics in Low Reynolds Number Fluidized Beds PHIL SEGRE, Physics Dep., Emory Univ., Atlanta Ga., JIM MCCLYMER, Physics Dep., Univ. of Maine, Orono ME — The sedimentation dynamics of extremely low polydispersity, $\sigma_a/a \sim 1.5\%$, non-Brownian, particles are studied in a liquid fluidized bed at low Reynolds number, $Re \ll 1$. When fluidized, the system reaches a steady state in which the local velocity fluctuations and particle concentration are found to become highly stratified with height in the column. Results are presented for the degree of stratification with normalized bed height H/a. We find that taller beds are more stratified than shorter beds. However, recent computer simulations have not found any measurable stratification with height. We reconcile this apparent disagreement by showing that the stratification in experiments of comparably small systems such as those studied by simulation are indeed very small. We also develop a simple advection-diffusion model that connects the velocity fluctuations to the concentration gradients, and account for the observed bed stability.

Phil Segre
Emory Univ. Physics Dep.

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