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**Scalings and Stability in Monodisperse Fluidized Beds** PHIL SEGRE, Phys. Dep., Emory Univ., JAMES SUSTMAN, Emory Univ., JIM MCCLYMER, Physics Dep., Univ. of Maine — We have measured the concentration and fluctuation profiles to investigate steady state sedimentation of nearly monodisperse ( $\sigma_a/a \leq 1.6\%$ ) fluidized beds over a wide range of particle sizes  $a$ . In terms of the normalized particle column height  $H^* \equiv H/a$ , we find that taller columns are more stratified, and exhibit larger fluctuations, than shorter columns. Operating at a single average volume fraction  $\phi_0$ , we find scaling relations for the concentration at the top interface,  $\phi_{top} = \phi_0 e^{-H^*/3711}$ , the velocity fluctuations,  $\sigma_v(z)/v_0 = \sqrt{H^*} \alpha(z)$ , and the correlation lengths,  $\xi(z) = a\beta(z)$ . Finally, we develop a new advection-diffusion model that describes the observed bed stability.

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