

Abstract Submitted  
for the DFD09 Meeting of  
The American Physical Society

**Numerical simulation of lateral segregation during Stokes bidisperse sedimentation and onset of irreversibility** XIAOLONG YIN, Assistant Professor, Petroleum Engineering, Colorado School of Mines — It is known that in Stokes bidisperse sedimentation particles of different sizes or densities will segregate in the lateral direction and form column structures. Numerical simulations were used to study lateral segregation in periodic domains containing 1146 particles of same size but different densities (particle-fluid density ratios = 1.4 and 0.6). The volume fractions were 0.15 and 0.15. The presence of lateral segregation was confirmed using a combination of visual observation and measurements of sedimentation velocities, velocity variance, and structure factors. By changing the direction of gravity during sedimentation, the reversibility of the suspension was tested. It was found that the system demonstrated reversibility for only about 6 Stokes times, and then lost its memory. Simulations conducted in domains with top and bottom walls did not show significant lateral segregation. The hindered settling velocities of the suspension in wall-bounded domains were between the predictions of Davis and Gecol (AIChE J. 40:570 1994) and those of Revay and Higdon (J. Fluid Mech. 243:15 1992).

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Date submitted: 06 Aug 2009

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