Abstract Submitted
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Dispersion and layering of solid particles in cylindrical Couette flows[1] MOHAMMAD SARABIAN, MOHAMMAD HOSSEIN FIROUZNIA, Ohio University, BLOEN METZGER, AIX MARSEILLE UNIVERSITY-CNRS, SARAH HORMOZI, Ohio University — Suspensions of rigid spherical particles in a cylindrical Couette flow of a Newtonian fluid is carefully studied at very low Reynolds number. We have used both Particle Tracking Velocimetry (PTV) and Particle Image Velocimetry (PIV) to examine the solid volume fraction and velocity field respectively. The experiments are carried out for a wide range of solid volume fractions (i.e., from dilute to dense suspensions). The results show that particles disperse toward the outer wall of the cylinder where a strong layering of particles occurs due to the confinement effects. We observe this phenomenon for the bulk volume fractions beyond 20%. The particle layering enhances drastically by approaching the limit of dense suspensions. We present the comparison of both transient and steady state results with available continuum model frameworks. These well resolved experimental results can be used as a benchmark for fully resolved numerical simulations.

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