Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Shear-induced migration and orientation of rigid fibers[1] JASON BUTLER, SCOTT STREDNAK, University of Florida, SAIF SHAIKH, Aix Marseille University / University of Florida , ELISABETH GUAZZELLI, Aix Marseille University — The spatial and orientation distributions are measured for a suspension of fibers during pressure-driven flow. The fibers are rigid and non-colloidal, and two aspect ratios (length to diameter ratios) of 12 and 24 were tested; the suspending fluid is viscous, Newtonian, and density matched to the particles. As with the migration of spheres in parabolic flows, the fibers migrate toward the centerline of the channel if the concentration is sufficiently high. Migration is not observed for concentrations below a volume fraction of 0.035 for aspect ratio 24 and 0.07 for aspect ratio 12. The orientation distribution of the fibers is spatially dependent. Fibers near the center of the channel align closely with the flow direction, but fibers near the wall are observed to preferentially align in the vorticity (perpendicular to the flow and gradient) direction.

[1]National Science Foundation (grants 1511787 and 1362060)

Jason Butler
University of Florida

Date submitted: 31 Jul 2017 Electronic form version 1.4