Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Concentrated suspensions in a homogeneous shear flow with finite fluid inertia KYONGMIN YEO[1], MARTIN MAXEY, Brown University —
The dynamics of monodisperse suspensions of neutrally buoyant particles under finite fluid inertia is investigated by numerical simulations using the force-coupling method. Here, we report on the effect of finite fluid inertia on the rheology and self-diffusion of the suspended particles for the volume fractions 0.2 - 0.4. It is found that the diffusivity is an increasing function of Reynolds number, while the particle-phase velocity fluctuations decrease at larger Reynolds number. Lagrangian velocity autocorrelation functions indicate that the motion of the suspended particles has a longer correlation under finite fluid inertia, which in turn contributes to the increase of the diffusivity. The changes in rheological parameters, such as the suspension viscosity and normal stress differences, under finite inertia are studied by analyzing pair-distribution functions. We found that the particle stresses become highly intermittent at larger Reynolds number.

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Date submitted: 03 Aug 2011 Electronic form version 1.4