Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Effect of sheared-induced diffusion on the transfer of heat across a sheared suspension[1] BLOEN METZGER, IUSTI CNRS UMR 7343, Marseille, France, XIAOLONG YIN, Petroleum Engineering, Colorado School of Mines, Golden, Colorado, USA, ICSD TEAM, YIN'S GROUP TEAM — Suspensions of non-Brownian particles undergoing shear provide a quasi-unique system where mixing occurs spontaneously at low Reynolds number. In essence, particles behave in the fluid as so many "stirrers." The questions raised are how do they affect the transport of heat/mass across sheared suspensions? What will be the influence of the particle size, their volume fraction and the applied shear? By using an index matched suspension and a laser induced fluorescence imaging technique, we were able to measure individual particle trajectories and correlate the particle diffusion motion to the thermal diffusion of the suspension. Particles cause a significant enhancement ($> 300\%$) of the suspension transport properties. Simulations which combine a Lattice Boltzman technique to solve the flow and a passive Brownian tracer algorithm to solve for the transfer of heat are in very good agreement with experiments.

[1]Funds: ANR JCJC SIMI 9 and IC-Star.

Bloen Metzger
IUSTI CNRS UMR 7343

Date submitted: 07 Aug 2012 Electronic form version 1.4