Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

On the Effects of Brownian particle Movement on the Overall Fluid Velocity Distribution WAY LEE CHENG, ANOOP BABY, REZA SADR, Texas A&M University at Qatar, MICRO SCALE THERMOFLUIDS LABORATORY TEAM — The suspension of nano-sized particles in a base liquid, known as nanofluids, are reported to display anomalous, often shown enhancement, thermal properties. This enhancement suggests a potential for industrial applications, in particular, for cooling systems. However, the underlying physics that leads to such enhancements in thermal performance is not fully understood. While nano particles/fluid interaction seems to be the main source of the observed phenomena, proposed theories in this regard are often disputed, and not conclusive, pointing to the need for more research in this field. In this study a simple approach is used to study the flow field in nanofluids due to randomly moving Brownian particles in a stationary fluid using numerical simulations. The unconfined Brownian motion of the particles is implemented via Langevin equation. The induced velocity field in the surrounding fluid is obtained by solving the governing hydrodynamic equations accounting for the motion of the particles and statistics of the flow field is then obtained. Effect of other parameters such as temperature and particle density is also investigated.

Reza Sadr
Texas A&M University at Qatar

Date submitted: 20 Aug 2012 Electronic form version 1.4