Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Investigation of the convective heat transfer in waterbased Alumina nanofluid[1] SHENG-QI ZHOU, RUI NI, KE-QING XIA, Department of Physics, The Chinese University of Hong Kong — Recent research has suggested that nanofluids have great potential in thermal applications due to their significantly high thermal conductivity [1]. But the buoyancy- driven convective flow would play an important role in the heat transport process. We have conducted an experimental measurement of the convective heat transfer in water-based Al_2O_3 nanofluid in a cylindrical cell (19 cm in both height and diameter). The nominal diameter of Al_2O_3 particle is 45 nm. At the fixed heating power, $Q = 513W$, it has been found that the convective heat transfer coefficient ($h = Q/\Delta T$, ΔT is the temperature difference across the cell.) decreases to 2% when the volume fraction of nanoparticle, ϕ, increases from 0.03% to 1.1%. At $\phi = 1.1\%$, we examined the relationship between Nusselt number (Nu) and Rayleigh number (Ra) of nanofluid. It has been found that the $Nu - Ra$ scaling of nanofluid follows that of pure water at higher Ra ($> 3 \times 10^9$). At lower Ra ($< 3 \times 10^9$), a deviation occurs, and it becomes more pronounced with decreasing Ra.// [1]. J. A. Eastman *et. al.*, Annu. Rev. Mater. Res. **34** 219, (2004).

[1]Work supported by the Research Grants Council of Hong Kong SAR (Project Nos. 404307 and and 404808).

Sheng-Qi Zhou
Department of Physics, The Chinese University of Hong Kong

Date submitted: 04 Aug 2008 Electronic form version 1.4