Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

The onset of particle-dominated convection regime in colloidal suspensions LAYACHI HADJI, MAHMOUD DARASSI, The University of Alabama — In the experiments of Bénard convection in a suspension of microparticle by Chang *et al.* (2008), a parameter β was isolated to model the interplay between the effects of thermophoresis, sedimentation and Brownian diffusion. A plot of β as function of the particle radius, r_p, for a suspension of aluminum oxide particles in water shows that the function $\beta(r_p)$ has the shape of an inverted parabola with two roots so that $0 < \beta \ll 1$ for 1 nm $\leq r_p \leq$ 5 nm and for $r_p \approx 50$ nm where thermophoresis and sedimentation are balanced. We consider a particulate medium model to determine the threshold instability conditions. Due to the large particle size, the convection process is characterized by longer diffusion time scale, much smaller Lewis number, τ, and larger separation ratio, S, than the binary mixture case. For $0 < \beta \ll 1$ which corresponds to two distinct particle radii, a small wavenumber expansion yields the value $R_c = 720\,\tau/S$. For $\beta = O(1)$, threshold stability conditions are depicted as function of the particle size and the height of the fluid cell.

Chang, B.H., Mills, A.F. and Hernandez, E., *Int. J. Heat Mass Transfer* **51** (2008), 1332-1341.

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Date submitted: 03 Aug 2012 Electronic form version 1.4