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**Benard convection in the presence of micro particles** LAYACHI HADJI, University of Alabama — We study Benard convection in water containing a small volume fraction of micro particles. The investigation is motivated by recent experiments of natural convection of aqueous suspensions [1] conducted at an average temperature of 20 degrees C in which the authors report a decrease in Nusselt number compared to pure water. This effect has been attributed to density inversion in the base state taking place near the lower boundary caused by the sedimentation of the aluminum oxide particles, the density of which is greater than that of water. We attempt to elucidate these findings by carrying a stability analysis on a model of convection for a liquid suspension having a nonlinear equation of state. The model accounts for the coupled effects of Brownian motion, sedimentation and thermophoresis. The balance of the latter yields a nonlinear base profile for the concentration of particles. Density inversion occurs near either the lower or the top boundary depending on the balance between sedimentation and thermophoresis and on the size and density of the particles. Parameter range for the onset and stability of the resulting double layer convection is given and the implications the results may have on the heat transfer in nanofluids are discussed.

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

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