Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Effect of thermal boundary condition on wall-bounded, stably-stratified turbulence OSCAR FLORES, MANUEL GARCIA-VILLALBA, Universidad Carlos III de Madrid — The dynamics of stably stratified wall-bounded turbulent flows are of great importance for many engineering and geophysical problems. In some cases, like the stably stratified atmospheric boundary layer, it is unclear which is the most appropriate thermal boundary condition, i.e. constant temperature or constant flux at the ground. Here, we analyze the effect that this boundary condition has on the dynamics of turbulent motions in the near-wall region in the case of strong stable stratification. Two Direct Numerical Simulations of turbulent channels will be used, at $Re_\tau = u_\tau h/\nu = 560$ and $Ri_\tau = \Delta\rho g h/\rho_0 u_\tau^2 = 600 - 900$, which are described in detail in Flores & Riley (2011, Boundary-Layer Meteorol) and Garcia-Villalba & del Alamo (2011, Phys.Fluids). For this range of Reynolds and Richardson numbers, the near-wall region is intermittent, with patches of laminar flow embedded in the otherwise turbulent flow. It is in this regime where the differences between the constant temperature and the constant flux boundary conditions are expected to be larger, with the thermal boundary condition affecting how the local relaminarization of the flow takes place. This research has been supported by ARO, NSF and the German Research Foundation.

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Date submitted: 03 Aug 2012 Electronic form version 1.4