Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Inhomogeneous temperature boundary conditions in Rayleigh-Bénarrd convection ROBERTO VERZICCO, DII, University of Roma Tor Vergata, DENNIS BAKHUIS, RODOLFO OSTILLA-MONICO, ERWIN VAN DER POEL, DETLEF LOHSE, PoF Univ. of Twente — In the ideal Rayleigh-Bénard problem it is assumed that the fluid layer is heated and cooled, respectively from below and above, by isothermal surfaces that strictly maintain the temperature constant regardless of the flow dynamics. This is however only an approximation since all thermal sources have properties that couple with those of the fluid. In this study we analyze, by three-dimensional direct numerical simulations, the heat and flow dynamics when the plates have non homogeneous temperature boundary conditions in order to understand to what degree the Nusselt number is affected. Several "temperature patterns" have been imposed on the plates with the Nusselt number that has shown a surprising robutness to the temperature inhomogeneity. The investigation is further extended to cases in which the plates are made by a sandwich of different materials and the temperature is inhomogeneous also within the plate thickness.

Roberto Verzicco
DII, University of Roma Tor Vergata

Date submitted: 16 Jul 2014 Electronic form version 1.4