Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Influence of container shape on scaling of turbulent fluctuations in convection NAJMEH FOROOZANI, University of Trieste, JOSEPH J. NIEMELA, International Centre for Theoretical Physics, VINCENZO ARMENIO, University of Trieste, KATEPALLI R. SREENIVASAN, New York University — We perform large-eddy simulations of turbulent convection in a cubic enclosure for Rayleigh numbers $1 \times 10^6 \leq Ra \leq 1 \times 10^{10}$ and molecular Prandtl number, $Pr = 0.7$. The simulations were carried out using a second-order-accurate finite-difference method in which subgrid-scale fluxes of momentum and heat were parametrized using a Lagrangian dynamic Smagorinsky model. The scalings of root-mean-square fluctuations of density and velocity in the cell center with Ra differ significantly from those in cylindrical containers, and are in agreement with laboratory observations by Daya and Ecke [*Phys. Rev. Lett.* **87**, 184501 (2001)], also using a cell with square cross-section. We find that the *time-averaged* spatial distributions of the local heat flux and temperature fluctuations are inhomogeneous in the horizontal plane, associated with the forced orientation of the mean wind along either one or the other diagonal. Larger values of the steady-state density (temperature) gradients occur at the mid-plane corners of the diagonal opposite to that of the mean wind, due to the presence of strong counter-rotating circulations.

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Date submitted: 30 Jul 2014 Electronic form version 1.4