Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Statistical convergence and the effect of large-scale motions on turbulent Rayleigh-Bnard convection in a cylindrical domain with 6.3 aspect ratio[1] PHILIP SAKIEVICH, Arizona State University, YULIA PEET, RONALD ADRIAN, Arizona State Univeristy — At high Rayleigh numbers in moderate aspect-ratio cylindrical domains turbulent Rayleigh-Bnard convection (RBC) exhibits coherent large-scale motions with patterns like some of those found in laminar flow. In this work we show how the patterns of the largest scales in turbulent RBC affect the bias and convergence of the flow statistics at aspect-ratio 6.3 (diameter/ height).Large scale motions influence two of the finite-time statistical means inherent properties: 1) the orientation of the patterns changes so slowly that it may appear almost fixed during a finite averaging time interval, thereby imbedding a preferred azimuthal direction in the sampled data; 2) they also have at least two states associated with the occurrence of up and down motions near the center of the convection cell. We will present a novel technique for triggering additional states of RBC in DNS simulations that are targeted for improving the statistical convergence of the flow. This technique gently perturbs the flow so that the new variations of the large scale patterns can be sampled.

[1]Funding through U. S. National Science Foundation Grants CBET-1335731, CMMI-1250124 and XSEDE research allocation TG-CTS150039

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Date submitted: 01 Aug 2016 Electronic form version 1.4