Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Geometry of tracer trajectories in turbulent rotating convection KIM ALARDS, HADI RAJAEI, RUDIE KUNNEN, FEDERICO TOSCHI, HERMAN CLERCX, Eindhoven University of Technology — In Rayleigh-Bénard convection rotation is known to cause transitions in flow structures and to change the level of anisotropy close to the horizontal plates. To analyze this effect of rotation, we collect curvature and torsion statistics of passive tracer trajectories in rotating Rayleigh-Bénard convection, using both experiments and direct numerical simulations. In previous studies, focusing on homogeneous isotropic turbulence (HIT), curvature and torsion PDFs are found to reveal pronounced power laws. In the center of the convection cell, where the flow is closest to HIT, we recover these power laws, regardless of the rotation rate. However, near the top plate, where we expect the flow to be anisotropic, the scaling of the PDFs deviates from the HIT prediction for lower rotation rates. This indicates that anisotropy clearly affects the geometry of tracer trajectories. Another effect of rotation is observed as a shift of curvature and torsion PDFs towards higher values. We expect this shift to be related to the length scale of typical flow structures. Using curvature and torsion statistics, we can characterize how these typical length scales evolve under rotation and moreover analyze the effect of rotation on more complicated flow characteristics, such as anisotropy.

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Date submitted: 26 Jul 2016 Electronic form version 1.4