Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

On Multiscale Geometrical Statistics of Anisotropic Homogeneous Turbulence FRANK JACOBITZ, Mechanical Engineering Program, University of San Diego, San Diego, CA, USA, KAI SCHNEIDER, M2P2-CNRS & CMI, Aix-Marseille University, Marseille, France, WOUTER BOS, LMFA-CNRS, Ecole Centrale de Lyon - Universite de Lyon, Ecully, France, MARIE FARGE, LMD-CNRS, Ecole Normale Superieure, Paris, France — Statistical geometrical properties of a variety of prototypical turbulent flows, including forced isotropic turbulence, sheared turbulence, rotating sheared turbulence, and rotating turbulence, are investigated in this study using results obtained from direct numerical simulations. Distributions of velocity helicity show a preference for two-dimensionalization for flows with growing turbulence and a trend to helical motion for decaying turbulence. A scale-dependent analysis shows a trend to two-dimensionalization for large scales of motion and a preference for helical motion at small scales. These results are consistent for all flows considered in this study. Joint probability distribution functions show a strong correlation of the signs of velocity helicity and vorticity helicity for all cases. This correlation supports the conjecture of Sanada (PRL 1993) that the vorticity helicity diminishes velocity helicity.

Frank Jacobitz
University of San Diego

Date submitted: 07 Aug 2010 Electronic form version 1.4