

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Statistics of vortex tube properties in isotropic turbulence SERGIO PIROZZOLI, University of Rome “La Sapienza” — The vortex tubes of isotropic turbulence are statistically analyzed by means of a feature-extraction algorithm applied to DNS data at several value of the Taylor Reynolds number. It is found that the main geometric parameters of the vortices (radius, induced velocity, core vorticity) exhibit log-normal distributions, and very nearly collapse in terms of Kolmogorov units. Consistent with previous studies, we have found that vortex tubes are special instances of the vorticity field associated with intensity stronger than the mean and local alignment of the vorticity vector, which subjected to the r.m.s background strain. Contrary to previous findings, however, we find that the vortex core radius and the local strain are nearly statistically independent, thus raising doubts on the relevance of vortex models based on stretched axi-symmetric vortices. The analysis of the azimuthal velocity profiles indicate scaling of the induced velocity similar to recent experimental findings, but very different from Burgers vortex model.

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Date submitted: 04 Aug 2008

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