Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Decay of fractal-generated homogeneous turbulence[1] PEDRO VALENTE, CHRISTOS VASSILICOS, Imperial College London — We present new hot wire anemometry measurements of decaying homogeneous, quasi-isotropic turbulence generated by low-blockage space-filling fractal square grids using different anemometry systems and hot-wires of decreasing diameter for increased spatial resolution. We find good agreement with previous works by Seoud & Vassilicos (2007) and Mazellier & Vassilicos (2010) but also extend the length of the assessed decay region. It is shown that the measured 1D spectra can be reasonably collapsed using a single length-scale (George 1992, George & Wang 2009) over the entire decay region even though the Reynolds number is high enough for conventional decaying turbulence to display 1D spectra with two-scale (inner and outer) Kolmogorov scaling. The weak anisotropy of the flow can be accounted for by computing the 3D spectrum function from two component velocity signals leading to further improved single-scale non-Kolmogorov collapse. Detailed checks on homogeneity and isotropy are presented as well as measurements with a regular grid indicating that the single-length scale locking is neither an artifice of, hardly present, inhomogeneity nor an effect of confinement from the wind-tunnel walls.

[1]P.C.V. acknowledges the support from the Portuguese Foundation for Science and Technology, grant no. SFRH/BD/1223/2009.

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Date submitted: 02 Aug 2010 Electronic form version 1.4