

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

PIV study of turbulence generated by fractal grids in a water tunnel¹ RAFAEL FERNANDES, Imperial College London, BHARATHRAM GANAPATHISUBRAMANI, University of Southampton, CHRISTOS VASSILICOS, Imperial College London — An experimental study of turbulence generated by low-blockage space-filling fractal square grids was performed using 2D Particle Image Velocimetry (PIV) in a water tunnel. In addition to the experimental technique (PIV) and the fact that it was carried out in water, this study has also the particularity of having considerable incoming free stream turbulence with an intensity, in the streamwise (u'/U) and spanwise (v'/U) directions, of 2.8 and 4.4 % respectively. Results on turbulence intensity and Taylor microscale of the flow generated by our fractal grids are in good agreement with the previous wind tunnel study of Mazellier and Vassilicos [“Turbulence without the Richardson-Kolmogorov cascade,” *Phys. Fluids* **22**, 075101 (2010)] provided that a different normalization scale is used which takes into account the free stream turbulence characteristics. This normalisation scale is a good estimator of the turbulence peak downstream of not only fractal but also regular grids. Finally, local isotropy of fractal generated turbulence was checked based on the gradients estimated from the 2D velocity field and compared with the ones from regular grids.

¹EPSRC Grant EP/H030875/1

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Date submitted: 27 Jul 2011

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