Abstract Submitted
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On the decay of homogeneous nearly isotropic turbulence behind active fractal grids[1] ADRIEN THORMANN, CHARLES MENEVEAU, Johns Hopkins University — The study of decaying isotropic turbulent flow is an important point of reference for turbulence theories and numerical simulations. For the past several decades, most experimental results appear to favor power-law decay with exponents between -1.2 and -1.4, approximately. More recently, fractal-generated turbulence (Hurst & Vassilicos, PoF 2007, and subsequent papers) using multi-scale passive grids suggest possible faster decay, and non-trivial behavior especially near the grid, where the mean velocity is spatially evolving. In order to generate spatially homogeneous flow using multi-scale injection of kinetic energy at high Reynolds numbers, we use a new type of active-grid consisting of winglets with various fractal shapes. We test space-filling fractal shaped winglets as well as Sierpisky-carpet and Apollonian packing type fractal shapes. Data are acquired using X-wire thermal anemometry. Tests of homogeneity of mean flow and turbulence intensity will be presented as well as decay of kinetic energy and spectral characteristics of the flow.

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