Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Experimental evaluation of square bar and fractal grid-generated turbulent flow inside recirculating water tunnel MATTHEW BORNEMEIER, LUKSA LUZNIK, US Naval Academy — High resolution, two dimensional PIV measurements of grid-generated turbulence in the US Naval Academy's recirculating water tunnel (1.8m test section with 0.41m x 0.41m cross sectional area) are presented for two different grid designs. The first grid is a uniform square bar grid with mesh width, M=3.9cm, bar thickness t_0 =1cm, a streamwise thickness of 1cm and resulting solidity of 44%, similar to the conventional grid used by Krogstad and Davidson (2012). The other is Mazellier & Vassilicos' (2010) square fractal grid, SFG17, with fractal iteration count, N=4, thickness ratio t_r =17 and length ratio L_r =8. Grid patterns differ from the published designs by a circular hole with 4.30cm diameter in the middle that will accept, in future experiments, a shaft connected to an axisymmetric rotating wake generator with diameter, D. Grids were designed to generate turbulence of specific integral length scale of O(D) and intensity of 6% at the prescribed downstream location. Mean tunnel centerline velocity is 2 m/s and measurements are made in a streamwise vertical center plane with nominal individual field of view (FOV) of 12x8 cm^2. Spatial coverage in the test section is accomplished by "tiling" individual FOV with approximately 2cm overlap. Results will focus on characterizing resulting turbulence in the test section and discussion will include comparison between published results and the present measurements.

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Date submitted: 27 Jul 2017 Electronic form version 1.4