Fractal geometry can be used to find organization or order in something that appears to be in disorder, or chaos. Turbulence is viewed as one place where fractal geometry can be found in nature. The irregularity in fluid flow is dependent on the initial conditions. In the past, the idea of self-similarity has been used to develop statistical theories of energy cascade in a turbulent flow. Recent studies have done experiments on obstructing flows with fractal objects to observe intermittency, (or self-similarity) within a turbulent flow. Experiments on fractal grid generated turbulence has been performed by other research groups, so far present studies have focused on fractal square, I-beam, and cross grids. We would like to create a fractal grid with different fractal designs than what has already been experimented on. A benefit of obtaining a greater understanding of self-similarity in a turbulent flow is being able to create further controlled high Reynolds number turbulence that can be used in future experiments. Data of the flow generated from the fractal grid will be taken using Particle Image Velocimetry. Particular aspects that can eventually be observed in the flow generated by the fractal grids include mean velocities, turbulence intensities, turbulence decay, energy dissipation, anisotropy, and the formation of vortices.

Drawing used for laser cutting a fractal grid with a 25% blockage ratio with respect to wind tunnel cross section and 2.5 thickness ratio of bars between each iteration.

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