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Multi-scale grid generated turbulence in an internal flow application PIYUSH RANADE, SCOTT MORRIS, University of Notre Dame — Turbulence generation using multi-scale, or fractal grids, is a method of creating high turbulence intensity flows passively by utilizing the intrinsic scales associated with the grid. This has become the topic of research in many external flow applications. In turbomachinery, the flow at the exit of the combustor and into the first nozzle stage is highly turbulent. In order to create high turbulence intensities in a lab setting passively, multi-scale turbulence generation grids are proposed. The presence of multiple length scales in the grid geometry innately gives rise to turbulent motions of a wide spectrum being shed immediately downstream of the grid, leading to high turbulence intensity flow. The biggest challenge with using such a grid in an internal flow, however, is to achieve spatial uniformity. In this research, three grid geometries commonly found in literature were tested in an experimental set-up consisting of flow between two flat plates. In addition, several other fractal grid geometries were created and tested in an attempt to maximize turbulence intensity while maintaining spatial homogeneity. This research hopes to begin giving insight into the development of turbulence downstream of a multi-scale grid in an internal flow setting.

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