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Use of grid generated turbulence to assess hot-wire spatial resolution and Pitot probe turbulence corrections ANAND ASHOK, MOHAMMAD JAVED, SEAN BAILEY, ALEXANDER SMITS, Princeton University — The objective of the present study is to use grid generated homogeneous isotropic turbulence as a benchmark flow to test the effect of turbulence on different measurement techniques. The grid turbulence is generated in a low speed 2 foot by 3 foot closed circuit wind tunnel using a 1 inch square mesh grid placed at the test section inlet. Measurements of the turbulence using a variety of hot-wire sensor lengths, at a series of streamwise distances downstream of the grid, will be used to investigate the impact of spatial filtering on different turbulence statistics and fully characterize the grid turbulence. Points of comparison will include basic mean and turbulent kinetic energy profiles as well as higher order statistics, the turbulent dissipation rate and finally turbulent spectra. These statistics will then be combined with additional measurements to assess the performance of turbulence corrections for Pitot probe velocity measurements. Finally, it is hoped that this flow can be used to assess the performance of a new nano-scale hot wire probe currently under development.

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