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Evaluation of aerodynamic performance of multi hot-wire vorticity probes through CFD analysis MINWEI GONG, SAVVAS XANTHOS, YIANNIS ANDREOPOULOS, City College of CUNY — The need to measure velocity gradients based quantities like rates of rotation, strain and dissipation of turbulent kinetic energy with good spatial and temporal resolution has led to the development of multi hot-wire probes which often consists of several arrays with 9 or 12 wires which require 18 to 24 prongs in total. Improving spatial resolution in the measurements of turbulence is the major reason for miniaturization of these probes. However, as the size of these probes is reduced, the effect of the size of the prongs and the probe holder becomes critical and it may affect the flow pattern around the probe. The flow around the vorticity probe developed by Agui et al (JFM, **524**, 143, 2005) and used in our shock tube experiments has been extensively simulated through CFD analysis. The evaluation included tests of velocity magnitude, response to yaw and pitch variation of incoming velocity vector, interaction with forward and backward traveling shock waves and expansion fans. The velocity measured by each of the 12 sensors of the probe is the average velocity over cells along the length of the corresponding wire. The results of yaw and pitch response provided an assessment of the acceptance cone of the probe which was compared to that obtained experimentally.

Yiannis Andreopoulos
City Collegeof CUNY

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