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Validation of a multi-sensor hotwire probe for boundary layer enstrophy measurements[1] SPENCER ZIMMERMAN, CALEB MORRILL-WINTER, University of Melbourne, JOSEPH KLEWICKI, University of Melbourne/University of New Hampshire — A multi-sensor hotwire probe capable of measuring the velocity and vorticity vectors has been designed and implemented in a turbulent boundary layer with the goal of educing the means by which the associated momentum transport is maintained under increasing scale separation between the velocity and vorticity fields with increasing Reynolds number. The capacity of this sensor to accurately measure each component of velocity and vorticity is first evaluated via synthetic experiment. The three-dimensional velocity field from the DNS of Sillero et al. (*Phys. Fluids* **25**, 2013) is used to compute effective cooling for each sensor element, and the resulting signals are interpreted via two-dimensional calibration surfaces such as would be used to process physical experimental data. Results from this virtual validation experiment are presented and suggest the sensor is capable of resolving key features of the velocity and vorticity fields at physically achievable spatial resolutions. Results from measurements collected at the Flow Physics Facility (FPF) at the University of New Hampshire are presented alongside these projections and exhibit very good agreement in trend, but with some differences in magnitude.

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