

Abstract Submitted  
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**On the accuracy of the velocity and velocity gradient statistics measured with multi-sensor hot-wire probes** PETAR VUKOSLAVCEVIC, Univ. of Montenegro, ELIAS BALARAS, JAMES WALLACE, Univ. of Maryland — A highly resolved turbulent channel flow DNS with  $Re_\tau = 180$  has been used to investigate the ability of multi-sensor hot-wire probes to accurately measure velocity and velocity gradient based statistics. Various sensor separations have been tested in order to study the effects of spatial resolution on the measurements. First, the effective cooling velocity has been determined for each sensor for (1) an idealized probe where the influence of the velocity component tangential to the sensors and flow blockage by the presence of the probe are neglected and (2) for a real probe, the characteristics of which have been determined experimentally. By simulating the response of the probes for these two cases to obtain the effective velocities cooling the sensors, velocity and vorticity component statistics have been calculated for two cases. These are (1) neglecting the velocity gradients for a two-sensor probe that can only measure velocity components and (2) assuming these gradients to be constant over a 12-sensor probe sensing area that can measure both velocity and vorticity components. These assumptions are unavoidable for real measurements with these two types of probes.

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