Four-sensor Hot-Wire Probes: A Calibration and Data Reduction Strategy DOUGLAS NEAL, LaVision Inc., JOHN FOSS, Michigan State University — Four-sensor hot-wire probes are capable of simultaneously measuring three components of the velocity vector with a high temporal resolution. Effective use of these probes requires sophisticated calibration and data reduction techniques and a number of different approaches have been published. Lavoie and Pollard (2003) evaluated four of these approaches and found them to vary significantly in terms of complexity, computational costs and accuracy of the results. Lavoie and Pollard showed the work of Wittmer (1998) is the least complicated to implement and has the smallest computational expense. The work of Doebbling (1990) has the best accuracy. A new technique for calibration and data reduction will be presented and compared against the methods of Wittmer (1998) and Doebbling (1990), using the same methodology and evaluation criteria. The results will be shown for a double x-array configuration over the calibration region of +/- 36° in pitch and yaw, but these methods are directly applicable to other four-sensor geometries.

[1] Lavoie, P., Pollard, A. (2003). "Uncertainty analysis of four-sensor hot-wires and their data-reduction schemes used in the near field of a turbulent jet." *Exp Fluids*, 34(3), 358-370.

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