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Nano-scale thermal anemometry probe[1] SEAN BAILEY, MARCUS HULTMARK, KARL MEYER, JEFF HILL, GARY KUNKEL, CRAIG ARNOLD, ALEXANDER SMITS, Princeton University — A nano-scale thermal anemometry probe is being developed with high spatial and temporal resolution to measure small-scale turbulence in high Reynolds number flows. Manufactured using a combination of semiconductor and micro-electromechanical manufacturing processes, two sizes of probe have been manufactured. Each probe consists of a platinum sensing wire of length $60\times1\times0.1$ μm or $20\times0.1\times0.1$ μm suspended between two contact pads. Preliminary measurements have been made comparing the nano-scale probe to a conventional hot-wire probe in both a zero pressure gradient turbulent boundary layer and in turbulent pipe flow using constant current anemometry and constant temperature anemometry. Results indicated that the nano-scale probe exhibits typical hot-wire behavior, but with a frequency response of at least three-times that of a conventional probe.

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