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Improvements of a nano-scale crossed hot-wire for high Reynolds number measurements[1] YUYANG FAN, MARCUS HULTMARK, Princeton University — Hot-wire anemometry, despite its limited spatial and temporal resolution, is still the preferred tool for high Reynolds number flow measurements, mainly due to the continuous signal. To address the resolution issues, the Nano-Scale Thermal Anemometry Probe (NSTAP) was developed at Princeton University. The NSTAP has a sensing volume more than one order of magnitude smaller than conventional hot-wires, and it has displayed superior performance. However, the NSTAP can only measure a single component of the velocity. Using a novel combining method, a probe that enables two-component velocity measurements has been created (the x-NSTAP). The measurement volume is approximately $50 \times 50 \times 50 \mu$m, more than one order of magnitude smaller in all directions compared to conventional crossed hot-wires. The x-NSTAP has been further improved to allow more accurate measurements with the help of flow visualization using a scaled model but matching Reynolds number. Results from turbulent flow measurements with the new x-NSTAP are also presented.

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