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**Investigation of Constant Temperature Hot-wire System Response using Laser Pulse** NICHOLAS JAFFA, Pennsylvania State Univ, SCOTT MORRIS, JOSHUA CAMERON, University of Notre Dame — Constant temperature hot-wire systems use a Wheatstone bridge and feedback amplifier circuit to maintain a constant average temperature across the wire yielding frequency responses of order 100 kHz. This high frequency response allows hot-wires to be used extensively for aerodynamic measurements in high speed flows and uncertainty at these high frequencies can be difficult to diagnose. The standard frequency response check for constant temperature hot-wires uses an electronic pulse across the circuit to check the electronic feedback circuit response time, but does not account for the impact of the heat transfer along the wire. In order to investigate the frequency response of the entire constant temperature hot-wire system, including the heat transfer along the wire, a novel method was developed using a pulsed PIV laser focused to illuminate only the hot-wire. The laser pulse duration was effectively an instantaneous change in wire surface temperature through radiation. A hot-wire was placed in a uniform open calibration jet for a range of flow conditions. The response of the entire hot-wire system was observed across a range of conditions including changes in flow, wire temperature, and thermal boundary conditions and compared with the electronic pulse test.

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