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Hotwire Probe Design and Calibration Technique for High Speed, High Temperature Flows ARMAN MIRHASHEMI, JOSHUA SZCZUDLAK, SCOTT MORRIS, University of Notre Dame — This presentation will describe a hot-wire probe manufacturing and calibration technique for high speed flows with variable high temperatures. The hot-wire probe was designed to work in flow temperatures as high as 650 K. A new sensor wire welding process was developed to ensure the sustainability of hot-wire probe in high temperature, high speed flows. In order to account for the flow temperature variations, non-dimensional film cooling and temperature loading correction factors were utilized in the calibration equation introduced by Collis and Williams. These corrections factors are functions of the wire and flow temperatures. It is shown in this work, that by using the stagnation temperature in evaluating the correction factors and the flow properties, Mach number effects on the calibration curve were minimized. This method accounts for relatively large flow temperature changes and does not require multiple calibrations over a range of temperatures. The proposed method of correction was successfully applied in a flow with Mach number range of 0.01-0.5 and temperature range of 580-644 K.

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