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Novel method and experimental validation of statistical calibration via Gaussianization in hot-wire anemometry IGAL GLUZMAN, JACOB COHEN, YAAKOV OSHMAN, Technion Israel Institute of Technology — We introduce a statistical method based on Gaussianization to estimate the nonlinear calibration curve of a hot-wire probe, that relates the input flow velocity to the output (measured) voltage. The method uses as input a measured sequence of voltage samples, corresponding to different unknown flow velocities in the desired operational range, and only two measured voltages along with their known (calibrated) flow velocities. The novel method is validated against standard calibration methods using data acquired by hot-wire probes using wind-tunnel experiments. We demonstrate our new calibration technique by placing the hot-wire probe at certain region downstream of a cube-shaped body in a free stream of air flow. For testing our calibration method we rely on flow statistics that exist, among others, in a certain region of a turbulent wake formed downstream of the cube-shaped body. The specific properties are: first, the velocity signal in the wake should be as close to Gaussian as possible. Second, the signal should cover the desired velocity range that should be calibrated. The appropriate region to place our probe is determined via computation of the first four statistical moments of the measured signals in different regions of the wake.

Igal Gluzman
Technion Israel Institute of Technology

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