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Evaluation of performance of multi-sensors hot-wire probes using Neural-Networks in-situ calibration DAN LIBERZON, Faculty of Civil and Environmental Engineering, Technion, Haifa, ELIEZER KIT, School of Mechanical Engineering, Tel Aviv University, Tel Aviv — Neural Networks (NN) based *in-situ* calibration of hot-wire anemometers was recently successfully implemented in field measurements. Although proving feasibility of field measurements using this, relatively new, calibration method the acquired field data also revealed some significant ambiguities in use of combined two- or three-sensor probes. A clearly better behavior of the probe comprised of four sensors (a pair of X shaped probes) has motivated the presented here work, aimed to investigate the NN based procedure performance dependence on the number of wires in the probe. Hypothesizing that the main reason for performance differences is in the fact that a 3-wire probe lacks any special features to withstand the noise in the signal due to temperature fluctuations and sensors' contamination, series of wind tunnel experiments with grid generated turbulence were designed and performed. Performance of a various multi-sensor probes' geometries was examined using the NN based method, while standard calibration data sets were also obtained prior to each set of measurements serving as a reference and as alternative training sets for the NN. The obtained results clearly indicated an advantage in using a symmetrical geometry, and especially using the four-sensor probe to obtain a reasonable description of the 3D velocity field. This is argued to be a result of redundant information on one or several velocity components present in four-sensor probes and serving as an efficient tool for noise reduction.

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