

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Control of the dynamic non-linearity in a Constant Voltage Anemometer GENEVIÈVE COMTE-BELLOT , Ecole Centrale Lyon, JULIEN WEISS, Duke University, JEAN-CHRISTOPHE BERA, Ecole Centrale Lyon — A second harmonic appears in most hot-wire anemometers due to a combined effect of the large amplitudes of the turbulent fluctuations, the thermal lag of the wire, and the electronic circuitry - see Corrsin Handbook of Physics, 8, 524-590, 1963, for a constant current anemometer (CCA) and Freymuth, Rev. Sci Instrum, 40, 258-262, 1969, for a constant temperature anemometer (CTA). For a constant voltage anemometer (CVA), which is a recent and innovative technique, it is shown that the second and higher harmonics can be rejected by inverting the differential equation which expresses the wire response and which is known (Comte-Bellot, CRC Handbook, 1998). This treatment is made when post-processing the data and it does not slow down the experiments. The constant frequency bandwidth insured by the partial thermal lag correction available in a CVA is also preserved. It is shown that the skewness factors of turbulent fluctuations, which are affected by the presence of a second harmonic, retrieve correct values.

Ronald Panton
University of Texas

Date submitted: 28 Jul 2005

Electronic form version 1.4