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Measurements of instantaneous temperature in oscillating flows¹ PHILIPPE BLANC-BENON, CNRS, ARGANTHAEL BERSON, Queen's University, GAELLE POIGNAND, GENEVIEVE COMTE-BELLOT, Ecole Centrale de Lyon, ECOLE CENTRALE DE LYON, FRANCE COLLABORATION, QUEEN'S UNIVERSITY, CANADA COLLABORATION — Temperature fluctuations in turbulent flows are usually investigated using cold wires operated by a constant-current anemometer. However, the output voltage of such anemometers is not hardware compensated for the thermal inertia of the wire. A correction is applied only during the post-processing of the data and requires the knowledge of the time lag of the wire, which depends both on the wire properties and on the instantaneous incident flow velocity. Here, a simple procedure for the instantaneous correction of the thermal inertia of cold wires is proposed. The method relies on the splitting of the time lag of cold wires operated in a constant-current mode into two factors: one depending on the wire properties and the other depending on flow velocity. These two factors are obtained from the operation of the wire by a constant-voltage anemometer in the heated-mode. The uncompensated signal delivered by the constant-current anemometer operating the cold wire is then processed to restore the signal that would be delivered by an ideal cold wire. Validation experiments are conducted in an acoustic standing-wave resonator where large-amplitude oscillatory flows take place.

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