

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Development of a 3-wire probe for the simultaneous measurement of turbulent velocity, concentration and temperature fields¹ ALAÏS HEWES, LAURENT MYDLARSKI, McGill University — The present work focuses on the design and optimization of a probe used to simultaneously measure the velocity, concentration and temperature fields in a turbulent jet. The underlying principles of this sensor are based in thermal-anemometry techniques, and the design of this 3-wire probe builds off the previous work of Sirivat and Warhaft, *J. Fluid Mech.*, 1982. In the first part of this study, the effect of different overheat ratios in the first two wires (called the “interference” or “Way-Libby” probe – used to infer velocity and concentration) are investigated. Of particular interest is their effect on the quality of the resulting calibration, as well as the measured velocity and concentration data. Four different overheat ratio pairs for the two wires comprising the interference probe are studied. In the second part of this work, a third wire, capable of detecting temperature fluctuations, is added to the 3-wire probe. The optimal configuration of this probe, including wire type and overheat ratio for the third wire, is studied and the simultaneously-measured velocity, concentration, and temperature data (e.g. spectra, PDFs) for different probe configurations are presented.

¹Supported by the Natural Sciences and Engineering Research Council of Canada (Grant 217184)

Laurent Mydlarski
McGill University

Date submitted: 30 Jul 2015

Electronic form version 1.4