

Abstract Submitted  
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**Measurements of scalar probability density functions and conditional expectations**<sup>1</sup> AMIR BEHNAMIAN, STAVROS TAVOULARIS, University of Ottawa — High resolution, multi-sensor, hot/cold-wire measurements were made in passively heated, uniformly sheared turbulence in a wind-tunnel, with focus on terms in the scalar PDF equation that require closure models. For the homogeneous scalar field that was produced by a uniform mean temperature gradient, results conformed with the literature: the scalar PDF was essentially Gaussian; the conditional expectations of velocities upon the scalar value were approximately linear; and the conditional expectation of the scalar dissipation rate upon the scalar value was mildly anisotropic and had a shape that was similar to those of any of its three parts, which justifies the use of the streamwise part as a surrogate for the total. All these properties behaved very differently in two inhomogeneous scalar fields, namely a thermal mixing layer and the plume of a heated line source: the scalar PDF were distinctly sub-Gaussian; the conditional velocity expectations were non-linear functions of the scalar value; and the conditional scalar dissipation rates were very strongly anisotropic, as well as depending on the scalar value in fashions that differed strongly from those of any of their three parts.

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