

Abstract Submitted
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Measurements of joint statistics of a passive scalar and its dissipation rate¹ MOHSEN FERCHICHI, Lakehead University, TONY STANDBRIDGE, STAVROS TAVOULARIS, University of Ottawa — The pdf formulation of scalar transport in turbulent flows requires modeling of the expectation of the scalar fluctuation destruction rate by molecular motions (“dissipation” rate), conditional upon the scalar value. In most previous experimental studies, the scalar dissipation rate has been approximated by its streamwise component, under the assumption of local isotropy. In the present study, we have measured simultaneously both the streamwise and transverse components of the dissipation rate and we have determined joint pdf of the scalar and its dissipation rate in uniformly sheared turbulence with a uniform mean scalar gradient. These joint pdf and corresponding co-spectra of the scalar and its dissipation rate suggest that these properties are statistically independent, whether the latter is approximated by its streamwise or transverse component. Further tests of scalar local isotropy in moderately large Reynolds number flow will also be presented.

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