

Abstract Submitted
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Statistics of passive scalar released from a point source in a turbulent boundary layer KAPIL CHAUHAN, MURALI KRISHNA TALLURU, The University of Sydney, JIMMY PHILIP, The University of Melbourne — Measurements in a turbulent boundary layer are performed to document the statistics of a passive scalar when released from a point source in the logarithmic region. The nominal Reynolds number is $Re_\tau = \delta U_\tau / \nu \approx 8500$, where $\delta \approx 0.36$ m is the boundary layer thickness, U_τ is the skin-friction velocity and ν is the kinematic viscosity. Simultaneous single-point measurements are performed using a combination of hot-wire and photo-ionisation detector traversing in the wall-normal direction. The tracer gas (1.5% iso-butylene) is released at a streamwise distance, $s_x/\delta = 1$, upstream of the test location with the exit velocity matched to the local mean velocity at the source height. Preliminary results adhere to the known reflected Gaussian behaviour for the mean and variance profiles of scalar fluctuations. Also, we find support for the exponential probability distribution of scalar at $z = s_z$, which is extended to other wall-normal locations. Further, results on the interaction between large-scale velocity fluctuations and scalar fluctuations will be discussed.

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