Experimental validation of a new closure scheme for turbulent diffusion using simultaneous PIV and PLIF PARTHA SARATHI, ROI GURKA, PAUL SULLIVAN, GREGORY KOPP, FACULTY OF ENGINEERING, THE UNIVERSITY OF WESTERN ONTARIO TEAM — In this work the focus is on the moments of the probability density function (PDF) of scalar concentration, which normally can be inverted to approximate the PDF. To solve the moment equations of the PDF one requires a closure approximation for both the convective and dissipative terms. Sullivan (2004) proposed closures that provide a good qualitative representation of measured moment distributions across a plume from a line source in grid turbulence for the lowest four central moments. Simultaneous measurements of velocity and scalar concentration, using particle image velocimetry (PIV) and planer laser-induced fluorescence (PLIF) respectively, on a plume in a grid turbulence water tunnel experiment are used to quantitatively explore the closure scheme. The closures are validated by analyzing the velocity and concentration fields and considering an axisymmetric plume in cylindrical coordinates system.

Partha Sarathi
The University of Western Ontario

Electronic form version 1.4