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Probability density function of a puff dispersing from the wall of a turbulent channel QUOC NGUYEN, DIMITRIOS PAPAVASSILIOU, The University of Oklahoma — Study of dispersion of passive contaminants in turbulence has proved to be helpful in understanding fundamental heat and mass transfer phenomena. Many simulation and experimental works have been carried out to locate and track motions of scalar markers in a flow. One method is to combine Direct Numerical Simulation (DNS) and Lagrangian Scalar Tracking (LST) to record locations of markers. While this has proved to be useful, high computational cost remains a concern. In this study, we develop a model that could reproduce results obtained by DNS and LST for turbulent flow. Puffs of markers with different Schmidt numbers were released into a flow field at a frictional Reynolds number of 150. The point of release was at the channel wall, so that both diffusion and convection contribute to the puff dispersion pattern, defining different stages of dispersion. Based on outputs from DNS and LST, we seek the most suitable and feasible probability density function (PDF) that represents distribution of markers in the flow field. The PDF would play a significant role in predicting heat and mass transfer in wall turbulence, and would prove to be helpful where DNS and LST are not always available.

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