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Effects of elevated line sources on turbulent mixing in channel flow QUOC NGUYEN, DIMITRIOS PAPAVASSILIOU, Univ of Oklahoma — Fluids mixing in turbulent flows has been studied extensively, due to the importance of this phenomena in nature and engineering. Convection effects along with motion of three-dimensional coherent structures in turbulent flow disperse a substance more efficiently than molecular diffusion does on its own. We present here, however, a study that explores the conditions under which turbulent mixing does not happen, when different substances are released into the flow field from different vertical locations. The study uses a method which combines Direct Numerical Simulation (DNS) with Lagrangian Scalar Tracking (LST) to simulate a turbulent channel flow and track the motion of passive scalars with different Schmidt numbers (Sc). The particles are released from several instantaneous line sources, ranging from the wall to the center region of the channel. The combined effects of mean velocity difference, molecular diffusion and near-wall coherent structures lead to the observation of different concentrations of particles downstream from the source. We then explore in details the conditions under which particles mixing would not happen. Results from numerical simulation at friction Reynolds number of 300 and 600 will be discussed and for Sc ranging from 0.1 to 2,400.

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