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Effects of near-wall turbulence structure on particles of different Schmidt number QUOC NGUYEN, CHIRANTH SRINIVASAN, DIMITRIOS PAPAVASSILIOU, The University of Oklahoma — The simulation of the trajectories of scalar particles with different Schmidt numbers, Sc, in turbulent channel flow shows that the effects of near-wall turbulence can lead to significantly different transport behavior for different Sc particles. The reason is that different parts and different scales of the coherent near-wall structures contribute to the transport of particles of different Sc. When particles enter the flow field from a common location at the channel wall, these interactions lead to the observation of different concentrations of particles downstream from the source, depending on their Sc and on time. While this is expected based on intuition, it is a rather interesting finding because it opens the possibility to separate particle dispersions according to their Sc using turbulence. A minimum difference in Sc is required, so that distinct transport mechanisms contribute to the transfer of each type of particle. Results from direct numerical simulation at friction Reynolds number of 300 and 600 will be discussed and for Sc that covers five orders of magnitude.

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