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Variations in scalar transport characteristics between forwards and backwards turbulent dispersion[1] CHIRANTH SRINIVASAN, DIMITRIOS PAPAVASSILIOU, The University of Oklahoma — Recent studies about backwards dispersion in time have shown differences with forwards turbulent dispersion, and have highlighted the importance of understanding these differences for practical applications. This work used a direct numerical simulation combined with a Lagrangian scalar tracking approach to obtain single particle and relative dispersion statistics for both forwards and backwards dispersion in an infinitely long turbulent channel flow. The computational domain was $4\pi h \times 2h \times 2\pi h$ in x, y, z (where h is the half channel height and h = 300 and h = 150). Results showed differences in the rates of forwards and backwards relative scalar dispersion. The variation in the rates of relative scalar dispersion for a variety of Prandtl numbers (Pr) from 0.1 to 50 was also investigated. The primary direction of heat transport was found to be oriented almost close to the direction perpendicular to the channel walls, for all regions of the channel and for Pr up to 1000. Higher and enduring rates of heat transport were observed for the case of backwards turbulent dispersion. In analogy with the physics of optics, a quantity named the "turbulent dispersive ratio" was introduced to indicate the differences between backwards and forwards dispersion.

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Dimitrios Papavassiliou
The University of Oklahoma

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