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Variance of scalar fluctuations using backwards relative dispersion in turbulent channel flows CHIRANTH SRINIVASAN, DIMITRIOS PAPAVASSILIOU, The University of Oklahoma — Temperature fluctuations at a location in a turbulent flow field are brought about by the arrival of particle pairs with different scalar concentrations. Studying backwards relative dispersion can be an alternative way to describe the local variance in scalar fluctuation. This work uses a numerical approach that couples a direct numerical simulation with the tracking of scalar markers to obtain scalar statistics in an infinitely long turbulent channel flow. Focusing on the anisotropic direction perpendicular to the channel walls, the two-particle correlation coefficients are used to determine a Lagrangian material time scale as a function of distance from the wall. Introducing a model that follows Durbin's theory [1], the variance of the temperature fluctuation is calculated by assuming that particle pairs that arrive at a particular location carry with them the mean temperature acquired at the location they were at a previous time. This earlier location is determined by utilizing the Lagrangian backwards timescale. Results obtained from this model are tested at two different Reynolds numbers (at $\mathrm{Re}_\tau = 150$ and 300) and for each Re case at several different Prandtl numbers (from 0.1 to 1,000). **References** [1] Durbin, P.A., J. Fluid Mech., 100, 279-302, 1980

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