Abstract Submitted
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**Study of scalar fluctuations downstream of a mandoline in grid turbulence** SHARADHA VISWANATHAN, STEPHEN B. POPE, Cornell University — We studied the decay of scalar fluctuations downstream of a heated mandoline in isotropic decaying grid turbulence. Probability Density Function (PDF) calculations are performed in conjunction with a modified Interaction by Exchange with the Conditional Mean (IECM) mixing model, in which the effects of molecular diffusion are directly incorporated in the mixing model as a mean conditional drift term. Previous experimental studies by Warhaft & Lumley (1978) and Warhaft (1984) (henceforth referred to as W78 and W84 respectively) suggest the dependence of the scalar variance decay rate on the scalar-to-turbulence length scale ratio. On the other hand, Sreenivasan et al. (1980) report a decay rate independent of the length scale ratio for length scale ratios smaller than unity. The present model calculations for a range of length scale ratios show that the decay rate of scalar variance is independent of the length scale ratio (for the conditions of the experiment), when plotted against distance from the mandoline. Comparison of the present model calculations with the experimental measurements of W78 and W84 show good agreement and are also consistent with the observations of Sreenivasan et al. For large times, our model predicts a decay rate given by $mC_\phi$, where $m$ is the velocity variance decay exponent and $C_\phi$ is a mixing model constant.

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