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A Simple Parameterization of Mixing of Passive Scalars in Turbulent Flows[1] AJITHSHANTHAR NITHIANANTHAM, KARAN VENAYAGAMOORTHY, Colorado State University — A practical model for quantifying the turbulent diascalar diffusivity is proposed as $K_s = 1.1\gamma' L_T k^{1/2}$, where L_T is defined as the Thorpe length scale, k is the turbulent kinetic energy and γ' is one-half of the mechanical to scalar time scale ratio, which was shown by previous researchers to be approximately 0.7. The novelty of the proposed model lies in the use of L_T, which is a widely used length scale in stably stratified flows (almost exclusively used in oceanography), for quantifying turbulent mixing in unstratified flows. L_T can be readily obtained in the field using a Conductivity, Temperature and Depth (CTD) profiler. The turbulent kinetic energy is mostly contained in the large scales of the flow field and hence can be measured in the field or modeled in numerical simulations. Comparisons using DNS data show remarkably good agreement between the predicted and exact diffusivities.

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