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Direct numerical simulation of top-down and bottom-up scalar diffusion in the convective Ekman layer[1] SCOTT WAGGY, SEDAT BIRINGEN, Department of Aerospace Engineering Sciences, University of Colorado, Boulder — The turbulent Ekman layer commonly serves as a model of the atmospheric boundary layer. In this work we study the unstably-stratified turbulent Ekman layer by means of a direct numerical simulation. Studies have demonstrated that entrainment processes at the top of the atmospheric boundary layer affect turbulence within the mixed-layer. In order to differentiate between bottom-up and top-down diffusion, surface fluxes are separated from entrainment effects by monitoring passive scalars with conditions indicative of these processes. For each case, the scalar variance is parameterized as a function of z/z_i, the distance from the wall normalized by the temperature inversion height. The ability of these idealized variance functions to represent scalar flux through the convective boundary layer, where both bottom-up and top-down diffusion occur, is assessed.

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