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Energetics of vertical fluid particle dispersion in stably stratified turbulence SEUNGBUM JO, KEIKO NOMURA, JAMES ROTTMAN, University of California, San Diego — The vertical dispersion of fluid particles in stably stratified turbulence is investigated. We present an analysis framework which describes the associated flow energetics in the Lagrangian frame. The total potential energy of a marked fluid particle is considered in terms of the available potential energy, associated with the nonequilibrium displacement, and the equilibrium (minimum) potential energy, associated with the change in particle equilibrium height. The corresponding evolution equations elucidate the key sequence of processes and clarify previous interpretations of the transport mechanisms. The analysis shows that in the case of stationary flow, the rate of mean square displacement is equal to the rate of mean square equilibrium displacement which is given by the scalar dissipation rate. The analysis is demonstrated using direct numerical simulations of stationary sheared turbulence. A dispersion model is developed and compared with previous models.

Keiko Nomura
University of California, San Diego

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