Abstract Submitted
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Overturning Structures in Symmetric and Asymmetric Shear Instabilities[1] ALEXIS KAMINSKI, Applied Physics Laboratory, University of Washington, JASON OLSTHOORN, DANIEL ROBB, University of British Columbia, ERIC D'ASARO, Applied Physics Laboratory, University of Washington — Turbulent mixing plays an important role in setting the distribution of heat, salt, and other biogeochemical tracers in the ocean, and quantifying the turbulent fluxes of these tracers is therefore a key question. A common approach is to look for signatures of turbulent overturns in one-dimensional profiles of temperature or other tracers and subsequently infer details of the accompanying fluxes and mixing. Often, these observed profiles are interpreted in the context of classical Kelvin-Helmholtz instability, in which shear drives the formation of a large overturn that subsequently triggers transition to turbulence. However, both the linear shear instability and nonlinear flow evolution can depend sensitively on the details of the background shear and stratification. Here we present the results of a series of direct numerical simulations of stratified shear instabilities with symmetric and asymmetric initial conditions, i.e. with either coincident or vertically offset profiles of shear and stratification. Motivated by recent Lagrangian float observations of the ocean transition layer, we examine the vertical structure of the resulting overturns. We describe both the size and stratification of these structures, and discuss implications for the associated buoyancy flux.

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