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Instability and mixing of stratified shear layers forced by internal wave strain ALEXIS KAMINSKI, JOHN TAYLOR, DAMTP, University of Cambridge — Mixing of the stably-stratified ocean interior plays an important role in determining the vertical stratification and the transport of key biological and geochemical tracers. Shear instabilities are thought to be a key mechanism in triggering small-scale mixing in the ocean, and a large literature is devoted to examining the stability properties of steady, parallel stratified shear flows. However, geophysical flows are frequently complicated by additional processes, such as internal waves, leading to variation in space and in time. Not only is the breaking of internal waves an important source of mixing, but the vertical strain caused by these waves may also impact the stability of the flows through which they propagate. Here, we idealize this process by imposing a standing wave which is spatially and temporally periodic onto a stably-stratified shear flow. We use a direct-adjoint looping method to examine the linear stability of this complicated base flow over a range of parameters in order to identify and quantify the effect of the wave strain on the overall flow stability. Direct numerical simulations are then used to examine the nonlinear evolution and subsequent mixing.

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