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Transition in Energy Spectra and Vortex Structures in Stably Stratified Turbulence YOSHIFUMI KIMURA, Graduate School of Mathematics, Nagoya University, JACKSON HERRING, NCAR — The power-law transition in the energy spectrum and relating vortex formation for stably stratified turbulence are investigated using the pseudo-spectral DNS of the Navier-Stokes equation under the Boussinesq approximation with 2048^3 grid points. From the zero total energy initial condition, integrated horizontal forcing is imposed in a narrow wave number band centered at k=5. At the first stage of the development, the horizontal energy spectra show a steep power-law ($\sim k_\perp^{4-5}$). By this time, we observe that many wedge vortices are produced and they move horizontally (like dipoles) in random directions. This stage lasts a long period of time, and then the tail part of the spectrum begins to rise to show the Kolmogorov-type slope ($k_\perp^{-5/3}$). During this stage of time, the wings of the wedges become thinner and thinner while translating, and finally detach to be almost independent vortex layers. This thinning mechanism makes the vertical shear stronger and eventually local Richardson number small to develop Kelvin-Helmholtz billows. The relation between the horizontal breaking of the Kelvin-Helmholtz billows and the observation of the Kolmogorov-type slope will be discussed.

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