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Formation of temperature front in stably stratified turbulence YOSHIFUMI KIMURA, Nagoya University, PETER SULLIVAN, JACKSON HERRING, National Center for Atmospheric Research — An important feature of stably stratified turbulence is the significant influence of internal gravity waves which makes stably stratified turbulence unique compared to homogeneous isotropic turbulence. In this paper, we investigate the genesis of temperature fronts–a crucial subject both practically and fundamentally–in stably stratified turbulence using Direct Numerical Simulations (DNS) of the Navier-Stokes equation under the Boussinesq approximation with 1024^3 grid points. Vertical profiles of temperature fluctuations show almost vertically periodic sawtooth wavy structures with negative and positive layers stacked together with clear boundaries implying a sharp temperature fronts. The sawtooth waves consist of gradual decreasing temperature fluctuations with rapid recovery to a positive value as the frontal boundary is crossed vertically. This asymmetry of gradients comes from the structure that warm temperature region lies on top of cool temperature region, and can be verified in the skewed probability density function (PDF) of vertical temperature gradient. We try to extract the flow structures and mechanism for the formation and maintenance of the strong temperature front numerically.

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