Analysis of effective eddy viscosity in DNS results of stratified turbulence SINA KHANI, MICHAEL L. WAITE, Department of Applied Mathematics, University of Waterloo — In order to perform large-eddy simulation (LES) of stratified turbulence, subgrid-scale (SGS) models are necessary to represent the effects of small scales on large scale motions. Since the inertial subrange of stratified turbulence is anisotropic for scales larger than the Ozmidov scale, isotropic SGS models do not seem to be the proper approach for LES of stratified turbulence. In this talk, direct numerical simulations of decaying stratified turbulence are analyzed to investigate the effective eddy viscosity in the presence of stratification. The results are studied under different Reynolds numbers, stratifications, and test cutoffs. It is shown that the presence of stratification causes a non-local horizontal energy transfer between large and small horizontal scales, which is not seen for the unstratified case. These results suggest the idea of using different eddy viscosities in the horizontal and vertical directions for scales larger than the Ozmidov scale, as is often done in large-scale atmospheric models, in which stratification is important. Overall, isotropic SGS models should be modified for use in LES of stratified turbulence.

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