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On turbulence in a stratified environment

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John Lumley, motivated by atmospheric observations, made seminal contributions to the statistical theory (Lumley and Panofsky 1964, Lumley 1964) and second-order modeling (Zeman and Lumley 1976) of turbulence in the environment. Turbulent processes in the ocean share many features with the atmosphere, e.g., shear, stratification, rotation and rough topography. Results from direct and large eddy simulations of two model problems will be used to illustrate some of the features of turbulence in a stratified environment. The first problem concerns a shear layer in nonuniform stratification, a situation typical of both the atmosphere and the ocean. The second problem, considered to be responsible for much of the turbulent mixing that occurs in the ocean interior, concerns topographically generated internal gravity waves. Connections will be made to data taken during observational campaigns in the ocean.