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Role of Subfilter-Scale Model Anisotropy on Large-Eddy Simulation of the Neutral Atmospheric Boundary Layer TIE WEI, JAMES BRASSEUR, Pennsylvania State University — A long-standing problem in large eddy simulation of neutral atmospheric boundary layer with eddy viscosity models is the over-prediction of mean shear near the surface. The near-surface errors arise from a mix of numerical and subfilter-scale (SFS) model issues at the first several grid levels, where integral scales are necessarily under-resolved and the turbulence is highly anisotropic. Here we study the role of SFS stress anisotropy by manipulating the traditional scalar (isotropic) eddy viscosity. In a numerical experiment we reduced the eddy viscosity for the diagonal SFS fluxes while keeping the traditional ones for the off-diagonal SFS fluxes. With the modified anisotropic SFS model the over-prediction of mean shear was reduced, the streamwise velocity variance was reduced and the vertical velocity variance was increased. There were also significant differences in the 2D horizontal energy spectra between the traditional and modified models. The modified models were less dissipative than the traditional ones. We aim to determine the underlying physical mechanisms that underlie the relationship between the anisotropic properties of SFS model and prediction.

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