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Improving large-eddy simulation on adaptive mesh refinement grids using the turbulence closure LAUREN GOODFRIEND, FOTINI CHOW, University of California, Berkeley, MARCOS VANELLA, ELIAS BALARAS, George Washington University — Large-eddy simulation (LES) and adaptive mesh refinement (AMR) reduce the computational cost of turbulence modeling by restricting resolved length scales, but combining these techniques generates additional errors. The grid refinement interfaces in AMR grids can create interpolation errors and reflect resolved energy. This talk will explore using the turbulence closure to mitigate grid interface errors in LES. Specifically, explicit filtering of the advection term and the mixed model are compared to implicit filtering and the eddy viscosity model. I will present a half-channel case study in which the domain is split into two structured static grids, one fine and one coarse. This simple test case allows observation of the effects of the grid interfaces. It is found that explicitly filtering the advection term allows both mass and momentum to be conserved across grid refinement interfaces by reducing interpolation errors. The mixed model decreases unphysical energy accumulation generated by wave reflection. These results inform the use of LES on block-structured non-uniform grids, including dynamic AMR grids.

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