

Abstract Submitted
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Large eddy simulation of decaying homogeneous isotropic turbulence on a block-structured non-uniform grid using reconstruction LAUREN GOODFRIEND, TINA CHOW, UC Berkeley, MARCOS VANELLA, ELIAS BALARAS, George Washington University — Modeling turbulence directly requires too many computational resources for many realistic problems to be tractable, so methods have been developed to reduce the computational size of turbulence simulation. Large-eddy simulation and adaptive mesh refinement reduce the computational cost of turbulence modeling compared to direct numerical simulation, but they are rarely used together. Errors appear at grid refinement interfaces due to dependence of computed quantities on the filter width and insufficient smoothness of the solution at the grid scale. Here, approximate reconstruction of the unfiltered velocity field is used to decrease these errors in a simulation of decaying homogeneous isotropic turbulence advected past a grid refinement interface. Different explicit filter types and levels of reconstruction are tested. Reconstruction was found to improve results in cases using a binomial approximation to a Gaussian filter for a fine to coarse grid refinement interface, the natural transition for decaying turbulence. These results inform the use of large-eddy simulation on more complicated adaptive mesh refinement grids.

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