Abstract Submitted
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Grid-independent LES[1] SANJEEB BOSE, PARVIZ MOIN, Center for Turbulence Research, Stanford University — Grid independent turbulent statistics are obtained in a planar channel flow at $Re_\tau = 640$ by explicit filtering the governing equations for LES. Three dimensional filters (Vasilyev et al., JCP, 1998) are utilized such that commutation error is the same order as the truncation error of the fourth-order, conservative finite difference scheme (Morinishi et al., JCP, 1998). Several calculations are performed with a fixed filter width, but with varying grid resolutions. The grid-independent mean velocity profile is in good agreement with the experimental data of Hussain & Reynolds (1970). The rms velocity profiles and one-dimensional energy spectra are compared with previous LES results and the unfiltered DNS of Abe et al. (2001), and show convergence toward a grid-independent profile. Ensemble averaged contributions of the dynamic Smagorinsky subgrid model to the Reynolds shear stress have also converged to a grid-independent profile across all grid resolutions. The effect of effective filter shape on the convergence of turbulence statistics will be discussed. Progress in the development of grid-independent LES for complex geometries with unstructured meshes will be presented.

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