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Effect of discontinuous filters on LES SEONGWON KANG, UGO PIOMELLI[1], FRANK HAM, GIANLUCA IACCARINO, Center for Turbulence Research, Stanford University — Simulations of turbulent flows in complex geometries often rely on unstructured grids, in which sharp interfaces between regions with widely different resolutions may occur. Here we perform LES in which interfaces between fine and coarse grids are artificially introduced. We distinguish two types of interfaces: parallel to the mean advection direction, and normal to it. In the first case, while the resolved stresses decrease as the grid is coarsened, the subgrid-scale (SGS) ones increase proportionately. If the grid interface is placed very close to a solid surface, a thicker sublayer results. When the interface is normal to the main advection we observe more complex behaviors. A sudden grid coarsening results in aliasing error and in loss of phase information. None of the SGS models tested is capable of adjusting properly to the decrease of the resolved stresses. A coarse-to-fine interface has a more benign character. Improvements based on decoupling the filter-width from the grid size and explicit filtering are proposed.

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