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Length scales in multi-resolution (hybrid) turbulence simulations SUNIL LAKSHMIPATHY, SHARATH S. GIRIMAJI, Texas A&M University — In direct numerical simulations (DNS) of turbulence, the smallest length scale in the flow is of the order of the Kolmogorov length scale η , which is determined from molecular viscosity and dissipation. The grid resolution should be of the order of η . In large eddy simulation (LES), the filter width determines the smallest scale of motion in the simulated field. But what is the smallest scale in hybrid or multiresolution turbulence computation schemes? In many of these schemes, the filter is implicit, rather than explicit and the filter width is not known. This renders grid resolution studies very difficult, if not impossible in hybrid methods. For such schemes, we propose that the computational Kolmogorov scale which is determined using eddy viscosity and dissipation is the smallest scale of motion. We study the length-scale distribution in severally multi-resolution Partially-averaged Navier-Stokes (PANS) calculations. It is found that the smallest scale is indeed of the order of computational Kolmogorov scale and the length-scale distribution is strikingly similar to that in DNS computations. This finding paves the way for efficient and optimal utility of grid in multi-scale resolution computations. (This work was funded by Sandia Laboratories, Albuquerque, NM)

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