

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

A posteriori analysis of spatial filters for approximate deconvolution large eddy simulations of homogeneous incompressible flows ANNE STAPLES, OMER SAN, Virginia Tech — We investigate the effect of low-pass spatial filters for approximate deconvolution large eddy simulation (AD-LES) of turbulent incompressible flows. We propose the hyper-differential filter as a means of increasing the accuracy of the AD-LES model without increasing the computational cost. Box filters, Pade filters, and differential filters with a wide range of parameters are studied in the AD-LES framework. The AD-LES model, in conjunction with these spatial filters, is tested in the numerical simulation of the three-dimensional Taylor-Green vortex problem. The numerical results are benchmarked against direct numerical simulation (DNS) data. An under-resolved numerical simulation is also used for comparison purposes. According to the criteria used, the numerical results yield the following two conclusions: first, the AD-LES model equipped with any of these spatial filters yields accurate results at a fraction of the computational cost of DNS. Second, the most accurate results are obtained with the hyper-differential filter, followed by the differential filter.

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Date submitted: 13 Aug 2012

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