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Effects of filtering parameter value on simulation results WEIYUN LIU, J.M. MCDONOUGH, University of Kentucky — Aliasing is a fundamental issue in discrete solutions of the Navier–Stokes equations. It arises from under resolution of numerical approximations as occurs in large-eddy simulation and must be treated with a filter. Two approaches to filtering have been distinguished in the LES context: implicit and explicit. Implicit filtering is formally applied to governing equations without specification of a particular filter, and explicit filtering is performed on computed solutions via a prescribed filter, as in signal processing. With explicit filtering, since filtered velocities are used in subsequent time steps, the aliasing phenomenon can potentially be removed completely; we will focus on this form in the present work. Numerical filters, however, are constructed so as to allow control of the degree of aliasing via parameter values set by the user. We will demonstrate that poor choices of such parameters can result in completely non-physical, yet numerically stable, computed solutions for two widely-used filters, Padé and Shuman, for a problem having abundant experimental data for comparisons.

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