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The Critical Importance of Aliasing in Near-Surface Large-Eddy Simulation TIE WEI, JAMES BRASSEUR, The Pennsylvania State University — Because large-eddy simulation (LES) implies unresolved energy, nonlinear aliasing is always of concern. However, aliasing may be critically detrimental to LES accuracy near surfaces and other regions where integral scales become badly under-resolved. We therefore carried out *a priori* analyses of aliasing in progressively under-resolved LES using DNS of homogeneous shear-driven turbulence. The spectral form of the aliased terms is used to explain differences in aliasing level among advective, divergence, skew-symmetric and rotational forms. We find that greater kinetic energy in the unresolved scales implies greater aliasing. However, as integral scales become progressively under-resolved consistent with near-surface LES, aliasing in the nonlinear term increases rapidly to levels as high as 60% the alias-free term! Shear-induced anisotropies alter the balance of aliasing among single/double/triple aliasing components and directions. It is therefore critically important to remove aliasing error near surfaces, but without additional loss of resolution, so grid shifting is preferred over truncation. We discuss grid-shifting methods relevant to under-resolved shear turbulence.

Tie Wei
The Pennsylvania State University

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