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Advances in the Design of LES to Capture Law-of-the-Wall: Role of the SFS Stress Model JAMES BRASSEUR, SANJIV RAMACHANDRAN, Penn State University, TIE WEI, Los Alamos National Lab — Large-eddy simulation (LES) has been plagued by the inability to capture law-of-the-wall (LOTW). In a recent paper (Brasseur & Wei, *Phys. Fluids* **22**) we presented a theory that explains the source of the difficulty and a framework within which LES can be designed to rectify the problem. To capture LOTW the LES must reside within the "High-Accuracy Zone" (HAZ) of a parameter space that can be adjusted with the model constant and grid. As the simulation penetrates the HAZ, the surface stress model influences LOTW, causing oscillations near the surface. We previously presented the source and a framework to mitigate this problem. These frameworks are independent of specific models. What is the role of the SFS stress model? We compare 3 SFS closures: Smagorinsky, 1-eq. eddy viscosity (EV), and a non EV closure. We show that all SFS models behave similarly and satisfy LOTW only when moved into the HAZ. All develop oscillations near the surface that were mitigated with the proposed adjustment to the surface stress model. The SFS stress model is known to affect (1) the critical parameters that define the HAZ, (2) the details and the path taken as the LES moves into the HAZ, (3) the tradeoff between model constant and grid aspect ratio to reach the HAZ, and (4) the prediction of the von Kármán constant. *Supported by ARO.*

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