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Wall-modeling in large-eddy simulation at high Reynolds number: an approach to predict accurate skin friction[1] SOSHI KAWAI, The Institute of Space and Astronautical Science, JAXA, JOHAN LARSSON, Center for Turbulence Research, Stanford University — We present a new idea to address one of major sources of error in large-eddy simulation with wall-modeling where the wall shear stress is modeled directly: the inevitable presence of numerical and subgrid modeling errors in the first few grid points adjacent to the wall. By considering the behavior of turbulence length scales near the wall and the grid resolution, the cause of the error is diagnosed and a simple yet efficient approach to remove the impact of the error on the computed turbulence is proposed. The proposed approach allows us to feed accurate well-resolved information from the LES to the wall-model, thus allowing the wall-model to function as intended: this in turn leads to accurately predicted skin friction. The method is applied to zero-pressure-gradient attached and shock-induced separated supersonic turbulent boundary layers at very high Reynolds number, and compared with available experimental data.

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Soshi Kawai
The Institute of Space and Astronautical Science, JAXA

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