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Numerical Simulations of Separated Flows Using Wall-Modeled LES ZACHARY VANE, Stanford Univ, JASON ORTEGA, KAMBIZ SALARI, Lawrence Livermore National Laboratory — Calculations using an unstructured, wall-modeled large eddy simulation (WMLES) solver are performed for several high Reynolds number test cases of interest. While the equilibrium formulation of this wall-model (Bodart, Larsson & Moin, AIAA 2013-2724) has proven to be accurate for steady, attached boundary layers, its application to non-equilibrium or highly three-dimensional problems has yet to be fully explored. A series of turbulent flows that exhibit boundary layer separation due to the geometries involved in each test case are considered. First, spanwise-periodic simulations for the flow over periodic hills are performed at multiple Reynolds numbers. Next, calculations involving separation caused by three-dimensional bodies are used to generate more complex flow fields and to evaluate the accuracy of the WMLES in the separated wake region downstream. The performance of the WMLES is quantified through comparisons with existing numerical and experimental data sets. The effects of grid resolution and variations in several wall-model parameters are also investigated to determine their influence on the overall calculation.

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