

Abstract Submitted  
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**Wall-Resolved Large-Eddy Simulation of Turbulent Flow Past a NACA0012 Airfoil**<sup>1</sup> WEI GAO, WEI ZHANG, RAVI SAMTANEY, KAUST — Large-eddy simulation (LES) of turbulent flow past a NACA0012 airfoil is performed at angle of attack (AoA)  $3^\circ$  and  $Re_c = 2.3 \times 10^4$ . The filtered incompressible Navier-Stokes equations are spatially discretized using an energy conservative fourth-order scheme developed by Morinishi *et al.* (J. of Comput. Phys., 1998), and the subgrid-scale (SGS) tensor is modeled by the stretched-vortex SGS model developed by Pullin and co-workers (Phys. of Fluids, 2000, J. of Fluid Mech., 2009). An extension of the original stretched-vortex SGS model is utilized to resolve the streak-like structures in the near-wall flow regions. The mean velocity and turbulence intensity profiles on airfoil surface and in wake are validated against experimental data reported in Dong-Ha Kim *et al.* (AIAA, 2009). To further verify our LES capacity, some high-order turbulence quantities are also compared with the DNS results produced by our in-house DNS code. The effect of grid-refinement on the wall-resolved LES approach is also discussed.

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