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Delayed Detached Eddy Simulation of Flow Over an Airfoil with Synthetic Jet Control<sup>1</sup> OMAR LOPEZ, GODSE UDAY, ROBERT MOSER, University of Texas at Austin — Delayed Detached-Eddy Simulation (DDES) is a hybrid RANS-LES model similar to DES but with modifications to reduce the influences of ambiguous grid densities in the numerical results. This model was implemented in CDP, a parallel unstructured grid incompressible flow solver, developed at the Center for Integrated Turbulence Simulations (CITS) at Stanford University. CDP has the advantage of being nearly energy conserving. Several simulations at static angles of attack at a Re based on the chord of 5.7e5 showed good agreement with experiments and other computational studies. Simulations of pitching and plunging cases have also yield good results. This simulation capability is being used to model closed-loop flow control of the airfoil. The action of tangential-blowing synthetic jet actuators mounted near the trailing edge of the airfoil are modeled as local momentum sources, based on detailed measurements of this configuration conducted at Georgia Tech. Resulting simulations show the effects of the actuators on the vortical structure of the flow, as well as on the aerodynamic properties. By integrating actuator and sensor models with a model of the flow controller, we will be able to simulate experiments currently being conducted by A.Glezer and his group at Georgia Tech. on the control of an airfoil in a wind tunnel.

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