Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Stall Control Simulation with an Impulse Jet[1] SOL KEUN JEE, ROBERT MOSER, University of Texas at Austin, OMAR LOPEZ, Universidad de los Andes, Colombia — An impulse jet is investigated numerically to understand the mechanism by which this jet controls a stalled flow over an airfoil. The DDES (delayed detached eddy simulation) turbulence model is used in this stall control study for a NACA 4415 airfoil at an angle of attack of 20 degree and Reynolds number Re=570,000. An impulse jet, which is applied upstream of the nominal flow separation point, generates vortices that convect downstream, interact with the separating shear layer, dismantle the layer and allow following vortices to propagate along the surface in the separation region. These following vortices shift the separation point aft reattaching the boundary layer, which returns slowly to its initial stall condition, as observed in wind-tunnel experiments. A simple model of the impulse jet actuator used herein is found to be sufficient to represent the global effects of the jet on the stalled flow because it correctly represents the momentum injected into the flow.

[1]This work is supported by AFOSR grant FA9550-05-1-0411.

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Date submitted: 26 Jul 2010 Electronic form version 1.4