Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

DNS of Surface Textures to Control the Growth of Turbulent Spots[1] JAMES STRAND, DAVID GOLDSTEIN, The University of Texas at Austin
— A spectral DNS code was used to study the growth and spreading of turbulent spots in a nominally laminar, zero-pressure gradient boundary layer. In addition to the flat-wall case, the interaction of these spots with riblets, fins, and spanwise-damping fins was examined. The flat plate, surface textures, and initial spot perturbation were simulated via an immersed boundary method, and a suction-wall allowed the available channel code to model a boundary layer. In all cases, self-similar arrowhead shaped spots formed. The spanwise-damping fins were very effective; the tallest damping fins were able to completely halt spot spreading. A decrease in spreading angle was also observed for several of the cases with real fins and with riblets. The best case of the real fins decreased the spreading angle 19 percent from the flat wall value, and the best case of the riblets decreased the spreading angle by 12 percent.

[1]We would like to thank AFOSR for support through grant FA 9550-07-1-0406. We would also like to thank TACC for the use of their computational resources.

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Date submitted: 04 Aug 2008 Electronic form version 1.4