Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Comparison of turbulent separation over a smooth surface and mako shark skin on a NACA 4412 hydrofoil[1] DREW SMITH, AMY LANG, REDHA WAHIDI, University of Alabama — Shark skin is being investigated as a means of passive flow separation control due to the flexibility and preferential flow direction of the scales covering the skin. In this study, the effect of the scales is observed in a tripped turbulent boundary layer by comparing the flow over a NACA 4412 hydrofoil with a smooth surface to that over the same hydrofoil with samples of mako shark skin affixed to its upper surface. These samples were taken from the flank area of the shark because the scales at that location have been shown to have the greatest angle of erection, and thus the best potential for separation control. All flow data in this study was obtained using Time-Resolved Digital Particle Image Velocimetry and recorded at multiple angles of attack (between 8 and 16 degrees) and two Reynolds numbers. The flow was primarily analyzed by means of the backflow coefficient (a value based on the percentage of time that flow in a region over the hydrofoil is reversed) and the time history of instantaneous flow velocity values at specific points in the boundary layer over the hydrofoil models.

[1]Research performed under NSF grant 0932352.

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Date submitted: 04 Aug 2011 Electronic form version 1.4