Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Separation control effects of mako shark skin applied to NACA 4412 hydrofoil and a cylinder[1] MICHAEL BRADSHAW, AMY LANG, University of Alabama, PHILIP MOTTA, MARIA HABEGGER, University of South Florida, ROBERT HUETER, Mote Marine Laboratory — Shark skin is investigated as a means of passive flow separation control due to its preferential flow direction and the potential for its scales to obstruct low-momentum backflow resulting from an adverse pressure gradient. In this study, the effect of the scales on flow reversal is primarily observed in a tripped turbulent boundary layer by comparing the flow over a NACA 4412 hydrofoil with a smooth, painted surface to that over the same hydrofoil with samples of mako shark skin affixed to its upper surface. Also, the effect of the scales on unsteady flow reversal is observed in laminar flow conditions for flow over a cylinder covered with mako shark skin. These samples were taken from the shark's flank region because the scales at that location have been shown to have the greatest angle of bristling, and thus the best potential for separation control. All sets of flow data in this study were obtained using Time-Resolved Digital Particle Image Velocimetry. 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), average backflow magnitude, and the time history of instantaneous flow velocity values at specific points in the boundary layer over the hydrofoil models.

[1]Research funded by NSF REU Grant # 1062611.

Amy Lang
University of Alabama

Date submitted: 01 Nov 2012 Electronic form version 1.4