Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Passive Flow Separation Control Mechanism Inspired by Shark Skin[1] INDIA OAKLEY, Alabama A&M University, AMY LANG, University of Alabama — The following experimental work seeks to examine shark scales as passive flow-actuated separation control mechanisms. It is hypothesized that the actuation of these scales can in fact reduce pressure drag by inhibiting flow reversal and thereby prevent flow separation. In order to examine this mechanism at a fundamental level, three-dimensional sharkskin scales were simplified and modeled as two-dimensional flaps. To further simplify the experiment, the flaps were observed within a laminar boundary layer. The laminar boundary layer was grown over a long flat plate that was placed inside a water tunnel. A rotating cylinder was also used to induce an unsteady, increasing adverse pressure gradient, which generated a reversing flow. In order to visualize the potential actuation of the two-dimensional flaps DPIV (digital particle image velocimetry) was utilized. Three main objectives for this work included, the actuation of the two-dimensional flaps, the resistance to a reversed flow as a result of flap actuation and the prevention of flow separation. However once the experiment was conducted the flaps did not perform as previously hypothesized. The adverse pressure gradient induced by the rotating cylinder did not produce a reversing flow powerful enough to actuate the flaps.

[1]NSF REU Site Award 1358991

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Date submitted: 30 Jul 2015 Electronic form version 1.4