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Characterization of Passive Flow-Actuated Microflaps Inspired by Shark Skin for Separation Control[1] JACKSON MORRIS, SEAN DEVEY, AMY LANG, PAUL HUBNER, The University of Alabama — Thanks to millions of years of natural selection, sharks have evolved into quick apex predators. Previous research has proven shark skin to reduce flow separation, which would result in lower pressure drag. Mako shark skin is made up of microscopic scales on the order of 0.2 mm in size. These scales are hypothesized to be a flow control mechanism, capable of being passively actuated by reversed flow. We believe shark scales are strategically sized to interact with the lower 5 percent of the boundary layer, where reversed flow occurs near the wall. Previous wind tunnel research has shown that it is possible to passively actuate 2D flaps in the lower regions of the boundary layer. This research aims to identify reverse flow conditions that will cause small 3D flaps to actuate. Several sets of microflaps (about 4 mm in length) geometrically similar to shark scales were 3D printed. These microflaps were tested in a low-speed wind tunnel in various reverse flow conditions. Microflaps were observed to be actuated by the reversing flow and flow conditions were characterized using a hot-wire probe. These microflaps have the potential to mimic the mako shark type of flow control in air, passively actuated by reverse flow conditions.

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