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Development of a Bio-inspired Microflap Array for Passive Control of Flow Separation[1] SEAN DEVEY, JACKSON MORRIS, PAUL HUBNER, AMY LANG, University of Alabama — The shortfin mako shark benefits from its flexible microscopic scales, or denticles; which can passively limit flow separation in water. These denticles can be passively actuated by incipient reversing flow in the lower 5% of the boundary layer, thereby impeding further flow reversal and promoting increased momentum exchange. In air, an array of flow actuated microflaps has the potential to provide similar benefits to man-made systems. Multiple iterations of microflap arrays have been developed and tested in the University of Alabama's Boundary Layer Tunnel. A variety of 3D-printed flaps derived from mako denticle geometries were arranged in rows with freedom to rotate, like mako denticles, to angles up to 50 degrees. Placing the microflap array in separated flow regions allowed for direct observation of the microflap response. Like mako denticles, microflaps with lengths of about 4 mm have been shown to actuate in response to reversing surface flows. This presentation will focus on the development and implementation of passive microflap arrays.

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