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A flow separation study over a shortfin mako shark pectoral fin[1]
MICHAEL BRADSHAW, AMY LANG, REDHA WAHIDI, DREW SMITH, The University of Alabama, PHILIP MOTTA, The University of South Florida — Many animals possess performance enhancing mechanisms, such as the denticles found on the skin of the shortfin mako shark (*Isurus oxyrinchus)*. The shortfin mako, one of the fastest sharks on the planet, is covered by small, tooth-like scales that vary in bristling capability. Previous biological findings have shown that the scales increase in flexibility from the leading to trailing edge over the pectoral fin. As this fin is a primary control surface, the scale bristling may provide a mechanism for separation control that leads to decreased drag and increased maneuverability. Such findings can potentially lead to the development of similar micro-scale mechanisms to improve the efficiency of aerospace design. A left pectoral fin (71 cm span) was tested in a water tunnel facility under static and dynamic conditions. Digital Particle Image Velocimetry (DPIV) was used to characterize the flow over the fin. Various angles of attack at two speeds were tested (Re of 44,500 and 68,000). Two chord-wise locations, approximately mid-span where three-dimensional effects were minimized, were viewed to analyze the flow. After the initial testing, the fin was painted to eliminate the effect of the scales and retested to observe flow separation.

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