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Control of a Turbulent Boundary Layer Separation Bubble by Shortfin Mako Shark Skin[1] AMY LANG, LEONARDO SANTOS, ANDREW BONACCI, JACOB PARSONS, University of Alabama — It has been demonstrated that samples of real shortfin mako shark skin can control turbulent boundary layer separation due to the passive actuation of the scales in the presence of reversing flow. Unlike vortex generators, this passive flow-actuated mechanism functions locally at the point where there flow needs to be controlled and this study demonstrates that shark skin is capable of controlling the flow even downstream of the point where separation is already occurring. As in previous studies, shark skin specimens were mounted to a flat plate and placed in a tripped turbulent boundary subjected to an adverse pressure gradient induced by a rotating cylinder. DPIV experiments were conducted in a water tunnel facility for three different Reynolds numbers (on the order of 10ˆ5) with different strengths of adverse pressure gradient to measure the control the presence of the shark skin had on the flow separation when the skin was placed on the downstream half of a quasi-steady turbulent separation bubble. Results confirm that the shark skin is able to control the flow by impeding the reversing flow near the surface. Furthermore, wall skin friction was calculated showing that the presence of the skin lowered the skin friction to the near zero vicinity but prevented it from going significantly negative as on the smooth wall cases.

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