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An Experimental Study of Flow Separation Control by Shortfin Mako Shark Skin[1] FARHANA AFROZ, AMY LANG, University of Alabama, PHILIP MOTTA, MARIA HABEGGER, University of South Florida — The shortfin mako shark (Isurus oxyrinchus) is a fast swimmer and has incredible turning agility. Shark skin is covered with flexible scales and this bristling capability may result in a unique Boundary Layer Control (BLC) method to reduce drag. It is hypothesized that scales bristle when the flow above it is reversed, and between the bristled scales embedded micro-vortices form in the cavities which induce boundary layer mixing and aid in delaying flow separation. To testify this hypothesis, samples of mako shark skin have been tested in a water tunnel under various strengths of adverse pressure gradient (APG). Laminar and turbulent separation over shark skin was studied experimentally using Time-Resolved Digital Particle Image Velocimetry (TR-DPIV) system, where the APG was generated and varied using a rotating cylinder. Then shark skin results were compared with that of a flat plate data for a given amount of APG. The study reveals that shark skin is capable of controlling both laminar and turbulent flow separation.

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