Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Low speed streaks as triggers for passive bristling of shark scales for turbulent boundary layer separation control[1] LEONARDO SANTOS, The University of alabama — Flow separation control has been observed over samples of flank skin from a shortfin mako shark. It is hypothesized that this control is enabled by the passive bristling of mako denticles by reversing flow close to the surface. It is hypothesized that the reversing flow within the low speed streaks, of a turbulent boundary layer experiencing and adverse pressure gradient, is the main mechanism that induces scale actuation leading to flow control. Upon scale actuation, the reversed flow would be prevented from moving further upstream and maintaining attached flow over the surface. Since the lifespan of the low speed streaks is very short, the response time of the scales could also be important for the functioning of this mechanism. A water tunnel DPIV study has been carried out to analyze the geometry and behavior of the low speed streaks forming within a turbulent boundary layer (Re around 10^5) under various strengths of adverse pressure gradient. Possible correlations between the low speed streak characteristics in terms of the viscous length scales and the geometry of shortfin mako scales from the flank region are explored.

[1]U.S Army Research Laboratory under grant no. W911NF-15-1-0556

Leonardo Santos
The University of alabama

Date submitted: 29 Jul 2019 Electronic form version 1.4