A Universal Parametric Study of Shark Denticles' Anti-Flow-Reversal Mechanism REID PRICHARD, WAYNE STRESSER, Liberty University, LIBERTY UNIVERSITY TEAM — The purpose of this study was to use computational methods to investigate the ability of shark scales to mitigate flow separation. To enable a broad, parametric analysis, we simplified a single denticle as a thin wall within a 2D Couette flow, wherein the upper moving wall represents a turbulent streak atop the viscous sublayer. We observed the effects of varying geometric parameters and characteristic numbers – including one novel parameter – on several metrics. Near-wall flow reversal is a precursor to flow separation, so we considered metrics such as mass flow through our domain and peak backflow velocity along a vertical midline. Our chief result was that blockage ratio – the proportion of the channel's height blocked by the denticle – is the primary factor correcting backflow, but we also found that smaller denticle angles more efficiently prevent backflow at a given blockage ratio. Our findings offer universal implications about the ability of sharkskin to impede separation.

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