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Reversing Flow Formation Induced by an Increasing Adverse Pressure Gradient in a Separating Laminar Boundary Layer[1] ANDREW BONACCI, AMY LANG, LEO SANTOS, University of Alabama — Reversing flow development in a laminar boundary layer is a determining factor in the development of dynamic stall. It has been demonstrated that shark scales are capable of being bristled by reversing flow leading to a passive mechanism for separation control. An investigation of the formation of the reversing flow over a smooth surface is key to understanding this passive flow-actuated bio-inspired separation control mechanism. A water tunnel facility is utilized to generate a separated region by using a rotating cylinder to induce an increasing unsteady adverse pressure gradient over a smooth flat plate. Growing the laminar boundary layer to a thickness of about 10 mm and Reynolds numbers of $1.67*10^5$ to $2.98*10^5$ makes the separation region more measurable with DPIV. Results are analyzed for reversing flow development in size and magnitude to better understand the viscous development of the separation point as a function of the strength and timescale of the increasing adverse pressure gradient.

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