Abstract Submitted
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First Signs of Flow Reversal Within a Separated Turbulent Boundary Layer[1] JARED HAMMERTON, AMY LANG, The University of Alabama — A shark's skin is covered in millions of microscopic scales that have been shown to be able to bristle in a reversing flow. The motive of this project is to further explore a potential bio-inspired passive separation control mechanism which can reduce drag. To better understand this mechanism, a more complete understanding of flow reversal within the turbulent boundary layer is required. In order to capture this phenomenon, water tunnel testing at The University of Alabama was conducted. Using a long flat plate and a rotating cylinder, a large turbulent boundary layer and adverse pressure gradient were generated. Under our testing conditions the boundary layer had a Reynolds number of 200,000 and a boundary layer height in the testing window of 5.6 cm. The adverse pressure gradient causes the viscous length scale to increase and thus increase the size of the individual components of the turbulent boundary layer. This will make the low speed streaks approximately 1 cm in width and thus large enough to measure. Results will be presented that test our hypothesis that the first signs of flow reversal will occur within the section of lowest momentum located furthest from the wall, or within the low speed streaks.

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