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Wind tunnel testing of a NACA 0012 airfoil with passive biomimetic flow control devices[1] CHRIS JARMON, AMY LANG, PAUL HUBNER, SEAN DEVEY, The University of Alabama — Increased demand for eco-friendly and energy-efficient transportation have led researchers to explore methods of drag reduction for decades. Previous studies have shown some success by both passive and active flow control techniques. Recent studies have shown that shark skin has the ability to passively alter the flow by inhibiting flow reversal and controlling flow separation. This study examines various 3D printed biomimetic flaps and scales inspired by sharks and birds to begin to determine optimum design parameters such as the presence of surface riblets and characteristic length. The biomimetic surfaces are placed on the upper surface of a NACA 0012 wing. Force data is acquired for baseline and biomimetic surface models (Re = 200,000) at fixed angles of attack (steady case), gradual pitching rate (quasi-steady case), and high frequency pitching rate (dynamic case). Results will be presented as to the correlation between the biomimetic flaps and the alteration of airfoil lift and drag.

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Chris Jarmon
The University of Alabama

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