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A robotic platform for studying sea lion thrust production MEGAN LEFTWICH, RAHI PATEL, ADITYA KULKARNI, CHEN FRIEDMAN, The George Washington University — California Sea Lions are agile swimmers and, uniquely, use their foreflippers (rather than hind flipper undulation) to generate thrust. Recently, a sea lion flipper from a deceased subject was externally scanned in high detail for fluid dynamics research. The flipper's geometry is used in this work to build an accurate scaled down flipper model (approximately 68% of the full size span). The flipper model is placed in a water flume to obtain lift and drag force measurements. The unique trailing edge features are then examined for their effect on the measured forces by comparing to similar flipper models with a smooth trailing edge, sinusoidal trailing edge, and a saw-tooth trailing edge. Additionally, a robotic flipper is being designed and built, replicating the sea lion foreflipper anatomical structure. The robot is actuated by a set of servo motors and replicates the sea lion flipper clap motion based on previously extracted kinematics. The flipper tip speed is designed to match typical full scale Reynolds numbers for an acceleration from rest maneuver. The model is tested in the water flume as well to obtain the forces and flow structures during the thrust production phase of the flipper motion.

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