Abstract Submitted
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The hydrodynamics and kinematics of sea lion swimming MEGAN C. LEFTWICH, CHEN FRIEDMAN, George Washington University — A highly interactive, non-research, female sea lion was used for studying its thrust production mechanisms at the Smithsonian National Zoo in Washington, DC. Videography was used for flipper kinematics extraction by tracing the flipper center line and studying the flipper shape throughout the thrust phase. Acceleration from rest was studied with respect to flipper angular rate and flipper shape by digitizing the videos using 10 points spanning root to tip. Resulting functions reveal spanwise camber of up to 32%, with instantaneous angular rates as high as 20 rad/sec, generating thrust values in the range of 150-680 N. The sea lion flipper was scanned using several 3D scanning techniques to generate a 3D model which will be used to reproduce a scaled robotic flipper for testing in a controlled laboratory setting. Techniques included two highly accurate structured light based 3D scanner, an image based software, capable of generating 3D meshes, and a kinect based scanner. A silicone mold of the flipper was also created for reference and comparison. The 3D models are used to extract several section airfoils which aid in both modeling the flipper computationally and designing foreflipper based robotic platforms.

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