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Aerodynamic Tests on a Static California Sea Lion Flipper ADITYA A. KULKARNI, MEGAN C. LEFTWICH, The George Washington University — Unlike most biological swimmers that use BCF swimming, the California sea lion relies on its foreflippers for thrust production. This unique swimming style, which lacks a characteristic oscillation frequency, allows the sea lion to leave less traceable wake while also producing high amounts of thrust. While the swimming energetics of the animal have been studied, almost nothing is known about the fluid dynamics of the system. To overcome this lack of basic understanding, a threedimensional model of the flipper was developed using structured light-based scanners. Cross sections of the flipper model resemble the shape of the airfoils typically found in wings with thickness ratios, 11% - 37%. Wind tunnel testing conducted on static flipper revealed that positive lift was being generated at negative angles of attack. This is hypothesized to help the sea lions considerably in perform tight maneuvers with a small turning radius. The wake structure downstream of the flipper was captured using Particle Image Velocimetry (PIV).

> Aditya Kulkarni The George Washington University

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