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**Experiments with Impulsive Motion of a Foil to Generate Large Lift and Thrust Forces** MIRANDA KOTIDIS, MICHAEL TRIANTAFYLLOU, Massachusetts Institute of Technology — As underwater vehicles become increasingly versatile and capable, bio-inspired propulsion systems are becoming a viable possibility for future vehicles. In particular, flapping foil actuators are promising in their abilities for propulsion and maneuvering. Current underwater vehicles rely on propellers, which form a jet wake to produce propulsion forces, and as such, experience an inherent delay between the movement of the propeller and the vehicle feeling a propulsive force. To mitigate this shortcoming, flapping foils were moved in swift, one-time strokes to produce large, transient forces in still water. These strokes take advantage of added mass/inertial effects to produce propulsive forces almost instantaneously. Various combinations of heave and pitch motions were tested and dye visualization was performed with a custom wing to elucidate the wake and vortical structures produced by these strokes.

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