

Abstract Submitted  
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**A Fast-Starting Robotic Fish** YAHYA MODARRES-SADEGHI, MATTHEW WATTS, JOE CONTE, FRANZ HOVER, MICHAEL TRIANTAFYLLOU, MIT TOWING TANK TEAM — We have built a simple mechanical system to emulate the fast-start performance of fish. The system consisted of a thin metal beam covered by a urethane rubber fish body. The body form of the mechanical fish in this work was modeled from a pike species, which is the most successfully studied fast-start specialist species. The mechanical fish was held in curvature and hung in water by two restraining lines, which were simultaneously released by pneumatic cutting mechanisms. The potential energy in the beam was transferred into the fluid, thereby accelerating the fish, similar to a pike. We measured the resulting velocity and acceleration, as well as the efficiency of propulsion for the mechanical fish model and also ran a series of flow visualization tests to observe the resulting flow pattern. We also studied the influence of stiffness and geometry of the tail on the efficiency of propulsion and flow pattern. The hydrodynamic efficiency of the fish, calculated by the transfer of energy, was around 10%. Flow visualization of the mechanical fast-start wake was also analyzed, showing that the acceleration is associated with the fast movement of an intense vortex in a near-lateral direction.

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