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A Robotic Fish to Emulate the Fast-Start TODD CURRIER, GANZHONG MA, YAHYA MODARRES-SADEGHI, University of Massachusetts Amherst — An experimental study is conducted on a robotic fish designed to emulate the fast-start response. The fish body is constructed of 3D printed ribs and a light spring steel spine. The body is actuated using a series of pressured pistons. A total of four pistons are supplied with pressure through lightweight high pressure service lines. The source of pressure is carbon dioxide with a 700 psi peak operating pressure resulting in a body response that can cycle a c-start maneuver in milliseconds. The motion of the fish is precisely controlled through the use of solenoids with a control signal produced by a programmable microprocessor. The fish is constrained in all translational degrees of freedom but allowed to rotate about a vertical axis. The influence of the point of rotation is studied with different mounting points along the length of the head of the fish. The forces are measured in two perpendicular in-plane directions. A high speed camera is used to capture the response of the fish and the corresponding flow around it. Comparison is made with the kinematics observed in live fish.

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