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Trailing edge geometry and angular pitching amplitude effects on the propulsive performance of bio-inspired pitching panels[1] JUSTIN KING, MELISSA GREEN, Syracuse University — Many of the aquatic swimmers found in nature propel themselves through the water by oscillating a caudal fin or fluke. Among various species, these propulsive appendages display a wide diversity of planform geometries, including those with different trailing edge shapes. In the current work, the effects of systematically varying the trailing edge shape and angular pitching amplitude on the propulsive performance of pitching panels are studied using time-resolved force measurements collected in a water tunnel experiment. Results focus on the thrust production, propulsive efficiency, and power consumption of pitching panels with straight, forked, and pointed trailing edges. In total, five distinct panel geometries were pitched about their leading edge in a constant free stream flow through multiple angular pitching amplitudes. Experimental results are discussed in the context of changes to the Strouhal number, St, which ranged between 0.09 and 0.66, and the three-dimensional wake structure, which was measured and presented previously. The current work also focuses on the implications of the performance measurements on the design of bio-inspired, underwater vehicles and the effects that propulsor geometry and kinematics may have on the swimming characteristics of aquatic animals.

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