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Wake structure of rigid pitching panels with biologically inspired geometry MELISSA GREEN, ALEXANDER SMITS, Princeton University — Digital Particle Image Velocimetry (DPIV), planar laser induced florescence (PLIF), and white light flow visualization were used to investigate the wakes of three rigid pitching panels, with trapezoidal panel geometry chosen to idealize fish caudal fins. The panel geometries are determined by sweep angle and have a fixed surface area. Experiments were performed for a range Strouhal numbers from 0.23 to 0.65. A classic reverse von Karman vortex street pattern was observed along the mid-span of the near wake, but the complexity and three-dimensionality of the wake increases away from the mid-span as streamwise vortices interact with the swept edges of the panel. There exists a critical Strouhal number to sweep angle ratio above which streamwise vortices flow freely around the spanwise edge. Below this critical ratio, the streamwise structures become trapped one one side of the panel and interact strongly with the vortices shed by the trailing edge.

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