

Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Experimental study of surface pattern effects on the propulsive performance and wake of a bio-inspired pitching panel¹ JUSTIN KING, RAJEEV KUMAR, MELISSA GREEN, Syracuse University — Force measurements and stereoscopic particle image velocimetry (PIV) were used to characterize the propulsive performance and wake structure of rigid, bio-inspired trapezoidal pitching panels. In the literature, it has been demonstrated that quantities such as thrust coefficient and propulsive efficiency are affected by changes in the surface characteristics of a pitching panel or foil. More specifically, the variation of surface pattern produces significant changes in wake structure and dynamics, especially in the distribution of vorticity in the wake. Force measurements and PIV data were collected for multiple surface patterns chosen to mimic fish surface morphology over a Strouhal number range of 0.17 to 0.56. Performance quantities are compared with the three-dimensional vortex wake structure for both the patterned and smooth panels to determine the nature and magnitude of surface pattern effects in terms of thrust produced, drag reduced, and wake vortices reshaped and reorganized.

¹This work was supported by the Office of Naval Research under ONR Award No. N00014-14-1-0418

Justin King
Syracuse University

Date submitted: 01 Aug 2016

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