

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Thrust Production and Wake Structure of a Batoid-Inspired Oscillating Fin¹ RICHARD CLARK², ALEXANDER SMITS, Mechanical and Aerospace Engineering, Princeton University — Experiments are reported on the hydrodynamic performance of a flexible fin. The fin replicates some features of the pectoral fin of a batoid fish (such as a ray or skate) in that it is actuated in a traveling wave motion, with the amplitude of the motion increasing linearly along the span from root to tip. Thrust is found to increase with non-dimensional frequency, and an optimal oscillatory gait is identified. Power consumption measurements lead to the computation of Froude efficiency, and an optimal efficiency condition is evaluated. Wake visualizations are presented, and a vortex model of the wake near zero net thrust is suggested. Strouhal number effects on the wake topology are also illustrated.

¹Supported by NSF//CRCNS Program

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Date submitted: 10 Aug 2005

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