Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Dynamics of Freely Swimming Flexible Foils SILAS ALBEN, Georgia Tech, CHARLES WITT, T. VERNON BAKER, ERIK ANDERSON, Grove City College, GEORGE LAUDER, Harvard University — We use experiments, simulations, and modeling to study thin foils which are oscillated at the leading edge and are free to move unidirectionally under the resulting fluid forces. We find resonant-like peaks in the swimming speed as a function of foil length and rigidity. We find good agreement between the inviscid model and the experiment in the foil motions (particularly the wavelengths of their shapes), the dependences of their swimming speeds on foil length and rigidity, and the corresponding flows. The model predicts that the foil speed is proportional to foil length to the -1/3 power and foil rigidity to the 2/15 power. These scalings give a good collapse of the experimental data.

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Date submitted: 10 Jul 2011 Electronic form version 1.4