Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Thrust generation of thickness-varying flexible fins YUANDA LI, PETER YEH, ALEXANDER ALEXEEV, Georgia Institute of Technology — We use three dimensional computer simulations to probe the hydrodynamics and thrust generation of an oscillating flexible fin with varying thickness. The fin is modeled as an elastic rectangular plate that plunges at its leading edge and is submerged in a viscous fluid. Since we assume that the thickest part of the fin is very small compared to its length and width, the plate is modeled as infinitely thin. We introduce an appropriate mass gradient and stiffness gradient in the plate to simulate the effects of the thickness gradient. As the fin flaps, fluid is displaced backwards and a net thrust is generated. We characterize this thrust generation as a function of driving frequency and find optimal conditions for largest propulsion. These findings are useful for designing biomimetic underwater propulsion devices.

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Date submitted: 27 Dec 2014 Electronic form version 1.4