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Understanding the energy economy of a batoid-inspired flexible fin[1] FLORIAN H.J. BREMER, STEFANO CHIAZZA, Princeton University, ALEXANDER J. SMITS, Princeton University and Monash University — Batoid-inspired autonomous underwater vehicles are interesting in that they offer the promise of fast and efficient motion. To investigate the effects of flexibility of the pectoral fins on the energy economy, free-swimming experiments are conducted an artificial fin in flapping motion. The experiments are conducted by initiating a flapping motion in the stationary fin, and by allowing the fin to accelerate to its free-swimming speed while keeping the amplitude and frequency of the actuation constant. The energy economy is derived by continuously measuring velocity and power input. Comparisons are then made among fins of varying flexibility to find the optimal energy economy.

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