Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Sensing and exploitation of vortices for a schooling fish AMY GAO, MIT, AUDREY MAERTENS, EPFL, MICHAEL TRIANTAFYLLOU, MIT — The question of whether fish are capable of actively sensing and using individual vortices while schooling has long been debated. Prior research has shown that fish can gain a hydrodynamic benefit when swimming in the wake of another fish. However, it remains unclear if lateral line feedback is necessary, and if so, how a fish may adjust its motion to maximize its energy savings. To begin to address this, we study though numerical simulations the hydrodynamic interactions between two fish swimming in tandem, focusing on the interaction of individual vortices with the following fish. Using a potential flow model, we show that the pressure sensed by the following fish can be captured with a low number of states, which provide information that allows the fish to locate near-field vortices and phase its undulating motion accordingly. We will discuss how vortex interactions along the fish can be beneficial, the signals they induce, and which strategies a fish may use to save the most energy.

Amy Gao
MIT

Date submitted: 01 Aug 2016 Electronic form version 1.4