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Fluid-mediated stable equilibria for two-dimensional schools[1] MELIKE KURT, KEITH MOORED, Lehigh University, MOORED LAB TEAM — Fish oscillate their fins and tails and create disturbances in the form of vortical wake structures. These fish often operate in groups or collectives, which alter these structures and consequently their force production. In the 1970s, Sir James Lighthill hypothesized that for fast locomotion, hydrodynamic interactions could give rise to orderly patterns in fish collectives without the need for collective decision-making or active control mechanisms. Previous studies tested this hypothesis by studying the force equilibria in one-dimensional schools where swimmers are arranged along the stream-wise direction in in-line configurations. Here, our goal is to investigate the existence of these equilibrium points in two-dimensional schools by varying synchrony, as well as the cross-stream and stream-wise spacings between two hydrofoils. To this end, flow field analysis, as well as force measurements, will be conducted to draw a relation between the fluid-mediated forces and vortical interactions within the flow-field.

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