Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Unsteady Flow Interactions Between Pitching Wings In Schooling Arrangements MELIKE KURT, KEITH MOORED, Lehigh University — In nature, many fish aggregate into large groups or schools for protection against predators, for social interactions and to save energy during migrations. Regardless of their prime motivation, fish experience three-dimensional flow interactions amongst themselves that can improve or hamper swimming performance and give rise to fluid-mediated forces between individuals. To date, the unsteady, three-dimensional flow interactions among schooling fish remains relatively unexplored. In order to study these interactions, the caudal fins of two interacting fish are idealized as two finite span pitching wings arranged in mixtures of canonical in-line and side-by-side arrangements. The forces and moments acting on the wings in the streamwise and cross-stream directions are quantified as the arrangement and the phase delay between the wings is altered. Particle image velocimetry is employed to characterize the flow physics during high efficiency locomotion. Finally, the forces and flowfields of two-dimensional pitching wings are compared with three-dimensional wings to distinguish how three-dimensionality alters the flow interactions in schools of fish.

Melike Kurt
Lehigh Univ

Date submitted: 30 Jul 2017 Electronic form version 1.4