Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Schooling of tandem flapping wings[1] MANAV GUZRATY, ANAND OZA, New Jersey Institute of Technology — We present the results of a theoretical investigation into the dynamics of tandem flapping wings, a model system for studying schooling swimmers in relatively fast flows. We develop a discrete dynamical system (iterated map) in which the swimmers shed point vortices during each flapping cycle, which in turn exert forces on the swimmers. Our model predictions exhibit good agreement with experimental data on the steadily-translating schooling states of tandem wings. If the wings execute identical flapping kinematics, we find that, as the flapping amplitude is progressively increased, the system undergoes a period-doubling cascade that ultimately leads to chaos. If the wings' flapping amplitudes or frequencies are distinct, we find that the wings may either separate, collide, or form unsteady bound states. Generally, our results indicate how hydrodynamics may influence the dynamics of schooling swimmers in biological contexts.

[1]A. O. acknowledges the support of the Simons Foundation (Collaboration Grant for Mathematicians, Award 587006). Both authors acknowledge the support of the NSF-Garden State Louis Stokes Alliance for Minority Participation (GS-LSAMP) program.

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Date submitted: 03 Aug 2020 Electronic form version 1.4