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Schooling of two tandem flapping wings: Simulations and theory FANG FANG, SOPHIE RAMANANARIVO, LEIF RISTROPH, MICHAEL SHELLEY, Courant Inst, APPLIED MATH LAB, NYU TEAM — We examine theoretically the hydrodynamic interaction of two tandem flapping wings. The two wings heave vertically with the same prescribed sinusoidal motion and each wing is free to choose its locomotion speed in the horizontal direction. We model the wings as flat plates and apply an improved vortex sheet simulation method to study their interaction through the fluid. Multiple stable schooling states are found from simulations and are consistent with experimental results. By applying an external load on the follower wing, we map out an effective hydrodynamic potential acting on the follower as a function of the "schooling number", which is defined as the tail-to-head separation distance over the wake wavelength. The hydrodynamic potential and drag-induced dissipation function are also calculated theoretically by applying a linear theory for the motion of the leader, the wake it produces, and for its effect on the follower.

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