

Abstract Submitted  
for the DFD09 Meeting of  
The American Physical Society

**Wake-mediated synchronization and drafting in coupled flags**

SILAS ALBEN, Georgia Tech — A recent experiment has shown “inverted drafting” in flags: the drag force on one flag is increased by excitation from the wake of another. Here we use vortex sheet simulations to show that inverted drafting occurs when the flag wakes add coherently to form strong vortices. By contrast, normal drafting occurs for higher-frequency oscillations, when the vortex wake becomes more complex and mixed on the scale of the flag. The types of drafting and dynamics (synchronization and erratic flapping) depend on the separation distance between the flags. For both tandem and side-by-side flags in synchronized flapping, the phase difference depends nearly monotonically on separation distance. These results provide a framework for how bodies interact through their wakes, and may be used to identify optimal rigidities and separation distances for bodies in collective locomotion.

Silas Alben  
Georgia Tech

Date submitted: 13 Jul 2009

Electronic form version 1.4