Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Synchronization and hydrodynamic interactions THOMAS POWERS, BIAN QIAN, KENNETH BREUER, Division of Engineering, Brown University — Cilia and flagella commonly beat in a coordinated manner. Examples include the flagella that Volvox colonies use to move, the cilia that sweep foreign particles up out of the human airway, and the nodal cilia that set up the flow that determines the left-right axis in developing vertebrate embryos. In this talk we present an experimental study of how hydrodynamic interactions can lead to coordination in a simple idealized system: two nearby paddles driven with fixed torques in a highly viscous fluid. The paddles attain a synchronized state in which they rotate together with a phase difference of 90 degrees. We discuss how synchronization depends on system parameters and present numerical calculations using the method of regularized stokeslets.

Thomas Powers
Division of Engineering, Brown University

Date submitted: 27 Nov 2007 Electronic form version 1.4