Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Direct measurement of the flow field around swimming microorganisms[1] MARCO POLIN, KNUT DRESCHER, RAYMOND E. GOLDSTEIN, DAMTP, University of Cambridge, NICOLAS MICHEL, Ecole Polytecnique, IDAN TUVAL, IMEDEA, Spain — Swimming microorganisms create flows that influence their mutual interactions and modify the rheology of their suspensions. While extensively studied theoretically, these flows have not been measured in detail around any freely-swimming microorganism. We report such measurements for the microphytes *Volvox carteri* and *Chlamydomonas reinhardtii*. The minute ($\sim 0.3\%$) density excess of *V. carteri* over water leads to a strongly dominant Stokeslet contribution, with the widely-assumed stresslet flow only a correction to the subleading source dipole term. This implies that suspensions of *V. carteri* have features similar to suspensions of sedimenting particles. The flow in the region around *C. reinhardtii* where significant hydrodynamic interaction is likely to occur differs qualitatively from a "puller" stresslet, and can be described by a simple three-Stokeslet model.

[1]We acknowledge support from the EPSRC, BBSRC, the Marie-Curie Program (M.P.), and the Schlumberger Chair Fund

Marco Polin
DAMTP, University of Cambridge

Date submitted: 06 Aug 2010 Electronic form version 1.4