Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Hydrodynamics of insect spermatozoa ON SHUN PAK, ERIC LAUGA, University of California San Diego — Microorganism motility plays important roles in many biological processes including reproduction. Many microorganisms propel themselves by propagating traveling waves along their flagella. Depending on the species, propagation of planar waves (e.g. *Ceratium*) and helical waves (e.g. *Trichomonas*) were observed in eukaryotic flagellar motion, and hydrodynamic models for both were proposed in the past. However, the motility of insect spermatozoa remains largely unexplored. An interesting morphological feature of such cells, first observed in *Tenebrio molitor* and *Bacillus rossius*, is the double helical deformation pattern along the flagella, which is characterized by the presence of two superimposed helical flagellar waves (one with a large amplitude and low frequency, and the other with a small amplitude and high frequency). Here we present the first hydrodynamic investigation of the locomotion of insect spermatozoa. The swimming kinematics, trajectories and hydrodynamic efficiency of the swimmer are computed based on the prescribed double helical deformation pattern. We then compare our theoretical predictions with experimental measurements, and explore the dependence of the swimming performance on the geometric and dynamical parameters.

On Shun Pak
University of California San Diego

Date submitted: 03 Aug 2010 Electronic form version 1.4