Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Locomotion in a turbulent world[1] M. KOEHL, Univ of California - Berkeley — When organisms swim or crawl in aquatic habitats, the water through which they travel is usually moving. Therefore, an important part of understanding how aquatic organisms locomote is determining how they interact with the fluctuating turbulent water currents through which they move. The research systems we have been using to address this question are microscopic marine animals swimming in turbulent, wavy water flow or crawling on surfaces in spatially-complex habitats exposed to such flow. Using a combination of field studies, wave-flume experiments, experiments in fluidic devices, and mathematical modeling, we have discovered that small organisms swimming or crawling in turbulent flow are not subjected to steady velocities. The shears, accelerations, and odor concentrations encountered by small swimmers and crawlers fluctuate rapidly, with peaks much higher than mean values. Although microscopic organisms swim slowly relative to ambient water flow, their locomotory behavior in response to the rapidly-fluctuating shears and odors they encounter can affect where they are transported by ambient water movement. Furthermore, the ability of small organisms to walk on surfaces without being dislodged by pulses of rapid flow constrains the microhabitats in which they can forage.

[1]Supported by NSF grant #IOS-0842685.

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Date submitted: 31 Jul 2014 Electronic form version 1.4