Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Temporal Patterns in Bivalve Excurrent Flow Under Varying Ambient Flow Conditions S.K. DELAVAN, D.R. WEBSTER, Georgia Institute of Technology — The predator-prey relationship between blue crabs (*Callinectes sapidus*) and bivalve clams (*Mercenaria mercenaria)* is mediated by the transport of metabolites released by the prey (clams) and transported downstream as a passive scalar. This study focuses on how the prey behavior contributes to the information available within the odorant plume. Clams may modify factors such as excurrent flux, flow unsteadiness, and siphon height and diameter. A Particle Image Velocimetry (PIV) system has been used to quantify the temporal patterns in the excurrent jet of the bivalve siphon under varying ambient flow conditions. According to a spectral analysis of siphon excurrent velocity time records, there is a low frequency periodic component that could contribute to the mixing of clam metabolites through the generation of persistent jet vorticies. Also, fractal analysis of the velocity time records shows that as the ambient velocity increases the excurrent velocity becomes more correlated and less random. These results suggest that for high ambient flow a low frequency periodicity may be sufficient to promote the mixing and dilution of metabolites. In contrast, for low ambient flow more random siphon excurrent velocity may be required to reduce the amount of information available to predators in the downstream odorant plume.

Donald Webster
Georgia Institute of Technology

Date submitted: 30 Jul 2008 Electronic form version 1.4