Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Aquatic mapping using hydrodynamic pressure sensing ROLAND BOUFFANAIS, DICK K.P. YUE, Massachusetts Institute of Technology — Pressure sensing is instrumental to most animals and organisms living in an aquatic environment: for instance fish at human scale through their lateral line and amoeba at microscale through mechanodetection at their surface. It also represents for underwater vehicles an alternative way of sensing the fluid environment when visual and acoustic sensing are limited. To assess the effectiveness of hydrodynamic sensing we propose a framework applicable to both high- and low-Reynolds number flows corresponding to typical fluid environment encountered by macro- and microswimmers respectively. In this framework both the forward and inverse problem corresponding to the object shape detection are presented. The forward mapping relies on a general solution of the pressure field expanded as an infinite series. The detection problem corresponds to the inverse problem which consists in determining some of the necessary coefficient of the expansion based on a noisy pressure signal over the limited length of the mechanosensing device.

Roland Bouffanais
Massachusetts Institute of Technology

Date submitted: 20 Jul 2009 Electronic form version 1.4