Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

MEMS Based Flow Sensors and Their Application on Flow Imaging YINGCHEN YANG, NANNAN CHEN, JONATHAN ENGEL, CRAIG TUCKER, SAUNVIT PANDYA, CHANG LIU, University of Illinois at Urbana-Champaign, MICRO AND NANOTECHNOLOGY LABORATORY TEAM — We report characterization and application of recently developed, MEMS based, out-of-plane hot-wire anemometer (HWA) sensor and bio-inspired artificial hair cell (AHC) sensor. Sensitivities of 0.2mm/s for HWA and 0.1mm/s for AHC have been achieved in water flows, comparing with 1mm/s of a conventional HWA. In contrast to its high sensitivity, the AHC sensor can survive 55° bending of its hair, making it very robust. After calibration, both HWA and AHC sensors were employed for dipole field and wake measurements. The dipole field was generated by a vibrating sphere in a large water tank; the measurement results match very well with the analytical model. The wake was created by a circular cylinder in a water channel; the RMS velocity distributions replicate the main features of a typical wake accurately. The two types of sensors were also applied in array format to mimic a fish lateral line for imaging hydrodynamic events. Multi-modal sensors capable of simultaneous measurement of flow velocity, shear stress, pressure and temperature are under development.

Yingchen Yang
University of Illinois at Urbana-Champaign

Date submitted: 09 Aug 2006 Electronic form version 1.4