Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Improving the Efficiency of Piezoelectric Fluidic Energy Harvesters[1] CHLOE DUQUESNOIS, INSA de Lyon, France, HUSEYIN DOGUS AKAYDIN, NIELL ELVIN, YIANNIS ANDREOPOULOS, The City College of New York, USA — Piezoelectric systems can harvest electrical energy from fluid flows. Maximizing the power output and increasing their overall energy conversion efficiency is a formidable challenge. We compare the conversion efficiencies of various harvester configurations. The first experimentally tested configuration is a cantilevered beam in the wake of a circular cylinder. An efficiency of only 0.03 per cent in converting fluidic to mechanical energy (i.e. "aeroelastic efficiency") was estimated while the efficiency of mechanical to electrical energy conversion (i.e. "electromechanical efficiency") was close to 11 per cent. In our latest experiments, we attached a circular cylinder to the free end of a piezoelectric beam. The aeroelastic efficiency increased to 2.5 per cent and the electromechanical efficiency is increased to 30 per cent. Placing a stationary circular cylinder upstream of this configuration caused a dramatic increase in harvested power and efficiency. Furthermore, attaching a cylinder of a half-circle cross section resulted in a much larger power and efficiency as compared to attaching a circular cylinder to the tip of beam.

[1]Sponsored by NSF Grant: CBET #1033117.

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Date submitted: 09 Aug 2011 Electronic form version 1.4