Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Pulsed Jet Propulsive Efficiency of a Small Underwater Vehicle at Low *Re*[1] ALI MOSLEMI, PAUL KRUEGER, SMU, ALI MOSLEMI TEAM — Propulsive efficiency of steady jet propulsion decreases as Reynolds number (Re) decreases. Pulsed-jet propulsion can be an alternative option for traditional jet propulsion since it generates higher thrust than steady jet with the same mass flux rate. Moreover, previous work with a self-propelled pulsed-jet vehicle (Robosquid) at Re in the range 1300 – 2700 has shown: (a) an increase in pulsed jet efficiency at higher duty cycle (St_L) and lower jet pulse length-to-diameter ratios (L/D), and (b) the propulsive efficiency can be comparable to or exceed that for an equivalent steady jet when $L/D < 4$ and $St_L > 0.5$. A simple analysis suggests further propulsive efficiency gains for pulsed jets over steady jets will be realized as Re is reduced. To test this prediction, Robosquid will be tested in glycerin to achieve Re less than 1000. The effect of St_L and L/D on propulsive efficiency will be measured at these lower Re and compared with the previous results at higher Re.

[1]This work is supported by NSF grant CBET - 0347958.

Ali Moslemi
SMU

Date submitted: 10 Aug 2009 Electronic form version 1.4