Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Optimal propulsive efficiency of vortex enhanced propulsion[1]
ROBERT WHITTLESEY, Exponent, Inc., JOHN DABIRI, California Institute of Technology — The formation of coherent vortex rings in the jet wake of a vehicle has been shown to increase the propulsive efficiency of self-propelled vehicles. However, the effect of varying vortex ring formation characteristics has not been explored for vehicles at Reynolds numbers comparable to autonomous or manned submersible vehicles. In this work, we considered a range of vortex ring formation characteristics and found a peak in the propulsive efficiency where the vortex rings generated are coincident with the onset of vortex ring pinch off. This peak corresponds to a 22% increase in the propulsive efficiency for the vortex-enhanced wake compared to a steady jet.

[1]We gratefully acknowledge the support of the Office of Naval Research Grants N000140810918 and N000141010137.

Robert Whittlesey
Exponent, Inc.

Date submitted: 23 Jul 2013 Electronic form version 1.4