Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

**The influence of surface waves on performance characteristics and wake measurements of a horizontal axis marine current turbine**[1] KAREN FLACK, ETHAN LUST, LUKSA LUZNIK, US Naval Academy — Performance characteristics and wake flow field results are presented for a 1/25 scale, 0.8 m diameter two bladed horizontal axis marine current turbine. The performance data and 2D PIV measurements were obtained in the 380 ft tow tank at the United States Naval Academy. The turbine was towed at a constant carriage speed of Utow = 1.68 m/s with turbine loading resulting in a nominal tip speed ratio of 7. Conditions with two regular waves were investigated. The first wave had a 2.3 second period and 0.18 m wave height, while the second wave had a 2.0 second period and a 0.20 m wave height. The waves were selected to have the same energy. Flow field measurements were obtained with an underwater PIV system comprised of two submersible housings. The forward looking submersible contained the laser sheet forming optics and the side looking submersible included a camera and remote focus/aperture electronics. Planar wake measurements were obtained 2 diameters downstream of the rotor plane. Flow field structures, as well as wave phase averaged mean velocities turbulence statistics will be presented and compared to the baseline case without surface waves.

[1]Work supported by the Office of Naval Research

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Date submitted: 30 Jul 2015 Electronic form version 1.4