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Influence of surface gravity waves on near wake development behind a towed model horizontal axis marine current turbine[1] LUKSA LUZNIK, KAREN FLACK, ETHAN LUST, US Naval Academy — 2D PIV measurements in the near wake flow field (x/D<2) are presented for a 1/25 scale, 0.8 m diameter (D) two bladed horizontal axis tidal turbine. All measurements were obtained in the USNA 380 ft tow tank with turbine towed at a constant carriage speed (Utow = 1.68 m/s), at the nominal tip speed ratio (TSR) of 7 and incoming regular waves with a period of 2.3 seconds and 0.18 m wave height. Near wake mapping is accomplished by "tiling" phase locked individual 2D PIV fields of view (nominally 30x30 cm^2) with approximately 5 cm overlap. The discussion will focus on the downstream evolution of coherent tip vortices shed by the rotor blades and their vertical/horizontal displacements by the wave induced fluctuations. This observed phenomena ultimately results in significantly increased downstream wake expansion in comparison with the same conditions without waves.

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