Real-time Ocean Wave Prediction for Optimal Performance of a Wave Energy Converter DANIELE CAVAGLIERI, THOMAS BEWLEY, University of California San Diego — In recent years, there has been a growing interest in renewable energy. Among all the available possibilities, wave energy conversion, due to the huge availability of energy that the ocean could provide, represents nowadays one of the most promising solutions. However, the efficiency of a wave energy converter for ocean wave energy harvesting is still far from making it competitive with more mature fields of renewable energy, such as solar and wind energy. One of the main problems is related to the inability to accurately predict the profile of oncoming waves approaching the wave energy converter. For this reason, we developed a new hybrid method for state estimation of nonlinear systems, which is based on a variational formulation of an ensemble smoother, combined with the formulation of the ensemble Kalman smoother. This method has been employed for the optimal forecasting of ocean waves via sensors placed on an array of wave energy converters. The coupled simulation of ocean waves and energy devices has been carried out leveraging a nonlinear High Order Spectral code.

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