

Abstract Submitted  
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**Simulation based study of the effect of ocean waves on floating wind farm**<sup>1</sup> DI YANG, Civil Engineering, Johns Hopkins University, CHARLES MENEVEAU, Mechanical Engineering & CEAFM, Johns Hopkins University, LIAN SHEN, Civil Engineering, Johns Hopkins University — A hybrid numerical capability is developed for the simulation of floating wind farm offshore, in which large-eddy simulation is performed for wind turbulence, and a potential flow based method is used for the simulation of ocean wavefield. The wind and wave simulations are coupled through a two-way feedback scheme. The effect of wind turbines on the wind field is represented by an actuator disk model. A variety of fully-developed and fetch-limited wind-sea conditions are considered in the study. The simulation results indicate that the offshore wind farm obtains a higher wind power extraction rate under the fully-developed wind-sea condition compared with the fetch-limited condition. This higher extraction rate is caused by the faster propagating waves and the lower sea-surface resistance on the wind when the wind-seas are fully developed. Such wave effect becomes more prominent when the turbine density of the wind farm increases.

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