Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Experimental study of improving power conversion capability of a floating point absorber with reactive control technique.[1] YE LI, QIANLONG XU, ZHILIANG LIN, XIAOBO ZHENG, NAOCE, Shanghai Jiao Tong University, BOYIN DING, BENJAMIN CAZZOLATO, ME, University of Adelaide — One of the biggest challenges for wave energy conversion (WEC) system to be competitive in the renewable market is to maintain a high and stable efficiency from stochastic ocean waves with wide spectrum. To solve this issue, there is an emerging need to develop a reactive control system (RCS) for WEC according to incoming wave condition via feedback control. An advanced boundary element method with viscous correction was developed to analyze the system dynamics. Scaled model tests were conducted in the newly developed multiple function towing tank at SJTU to study the power generation of a floating point absorber with RC. Incoming wave information is well integrated into control loop with a group of gauges. The results show that power output of RCS can be about 2-3 times higher than that of passive control system (PCS). High efficiency spectrum of RC-WEC ranges 1.5 times wider than PC-WEC's. Viscous effect increases with power generation coefficient, indicating the significance of geometry optimization with control system optimization together. Power output efficiency decreases as wave height increases, indicating that increasing nonlinear hydrodynamics can degrade the performance of linear control.

[1]This work was supported by National Natural Science Foundation of China (No. 51761135012).

Ye Li
NAOCE, Shanghai Jiao Tong University

Date submitted: 30 Jul 2019 Electronic form version 1.4