Effects of Mooring Systems on Submerged Point Absorber Wave Energy Converters

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The purpose of this project was to test if there was a correlation between mooring configurations and the amount of consistent electricity a submerged wave energy converter can produce. I hypothesized if the submerged point absorber wave energy converter had three points of mooring, then the device would be most effective at consistently producing electricity. The experiment involved mooring a model point absorber wave energy converter in a wave tank in different mooring configurations and generating waves of different states. Four mooring points were used as the control variable. The mooring configuration (1-3 lines) was the independent variable. A data acquisition system was used to record the electricity generated. The data collection did not support the original hypothesis. The findings lead to the conclusion that the most consistent electricity was produced when there was one mooring line. Statistical analysis suggested that one mooring was statistically significant compared to the control variable and it produced 206% more electricity than the control. In mooring configurations two, three, and four (control), the device was too restricted and could not move to capitalize on the necessary vertical and horizontal motion. When there was one mooring point, the device was able to move with each wave and maximize movement in three planes, leading to the generation of the most consistent electricity production over all of the 24 tests (8 wave states with 3 trials per state).

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