

Uncertainties and reproducibility of a multibody floating wave energy converter model study

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My PhD topic aligned with my research interest in the field of experimental marine renewable energy. Doing research with Blue Economy CRC helps me in enhance my existing knowledge and skills, with the added value of collaboration with a network of brilliant professionals in this field from diverse institutes.

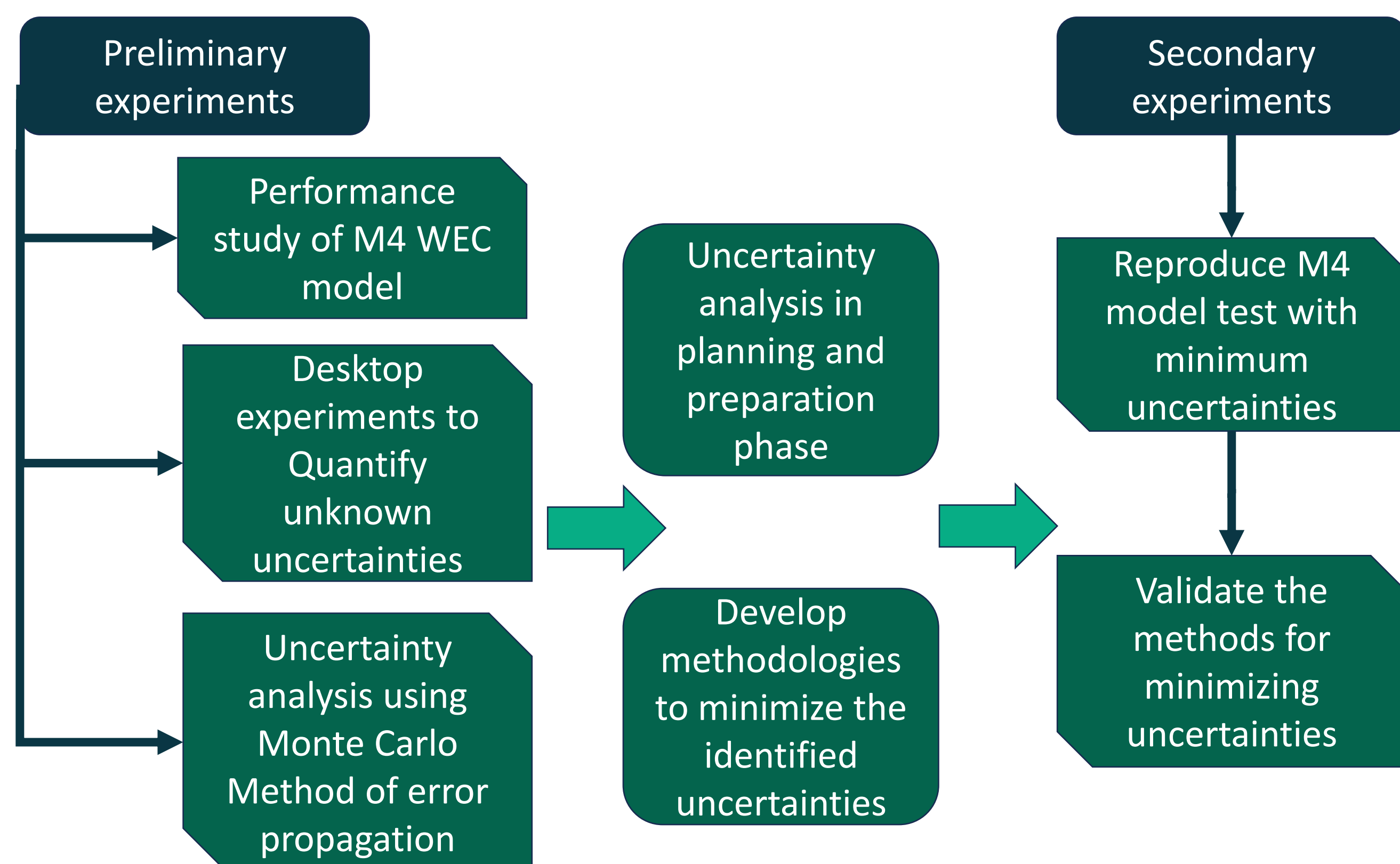
After my PhD I aspires to contribute to the future of sustainable energy through innovative solutions in the field of marine renewables.



Problematic

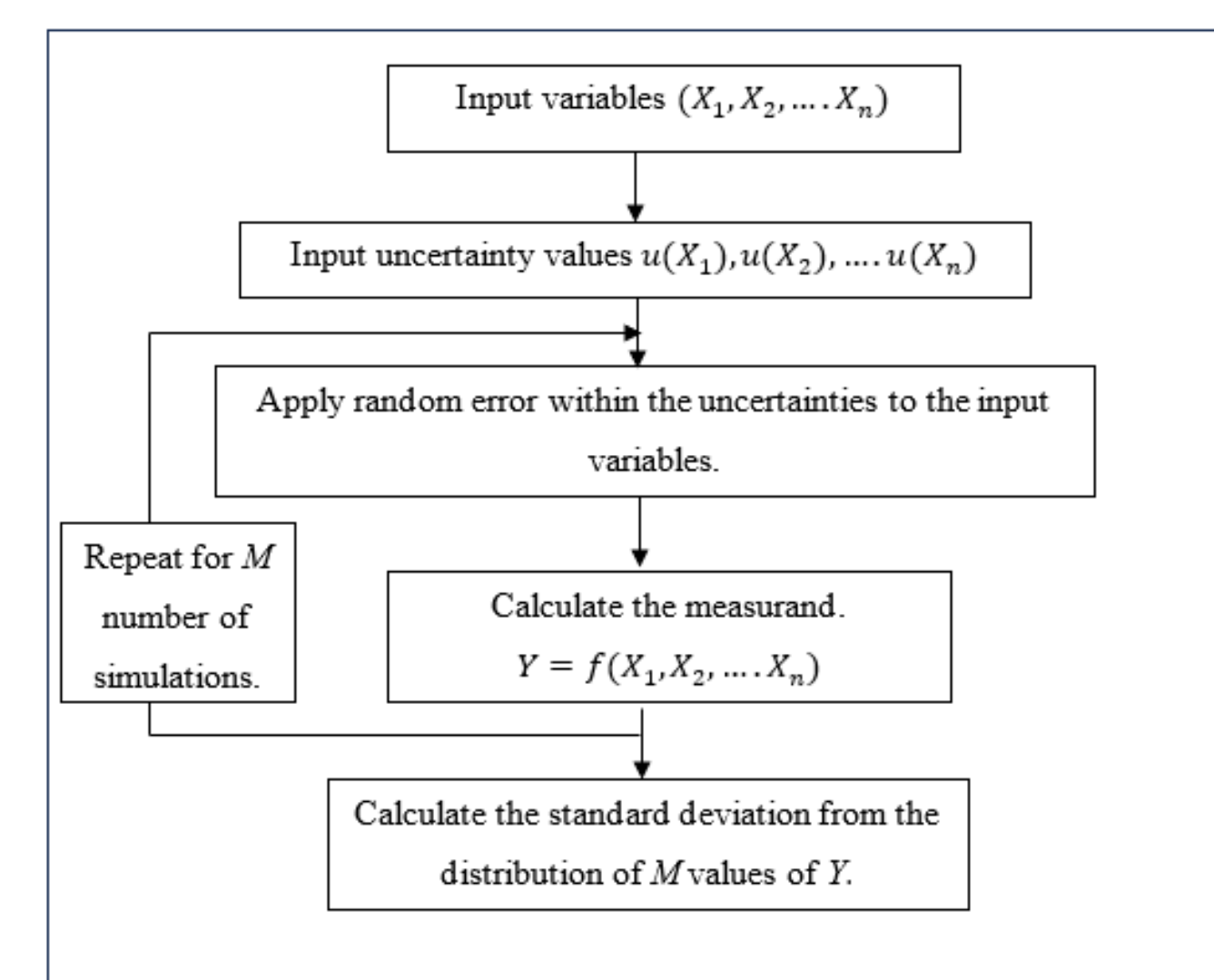
- Deploying wave energy converters (WEC) in open sea involve high risk and high investment so it is important to perform testing on small scale models in controlled laboratory to estimate power performance, behavior and return on investments before deploying to minimize risks and optimize the final design.
- The guidelines for WECs model studies are still in maturing stage and discussion on uncertainties are added only in the recent years. Uncertainty analysis of more model studies are required to refine the guidelines.
- Failure of many previous concepts of WECs to progress beyond pre-commercial stage highlight the importance of model studies and need of more understanding of the involved uncertainties.

Research methodology

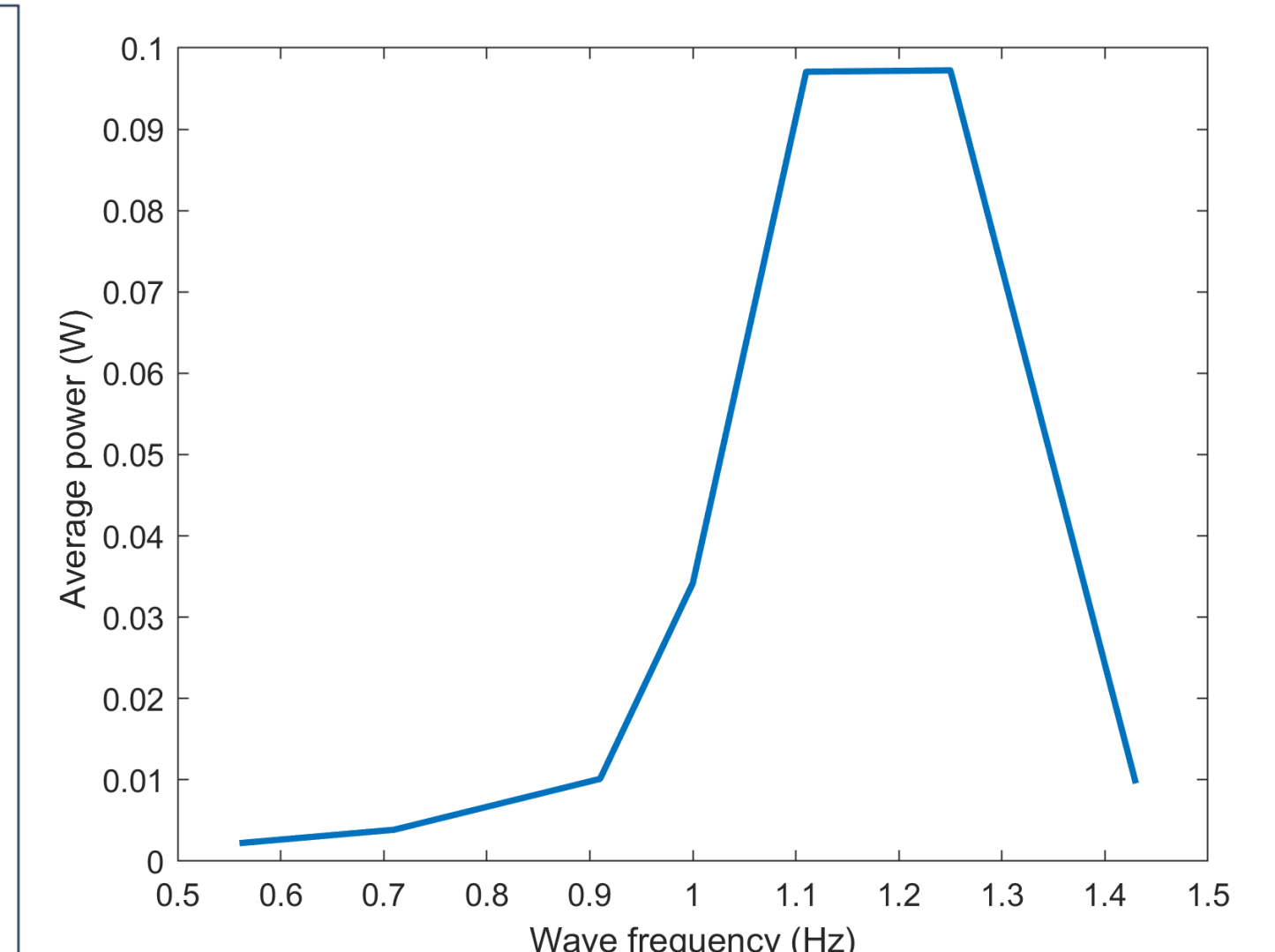


Research Questions

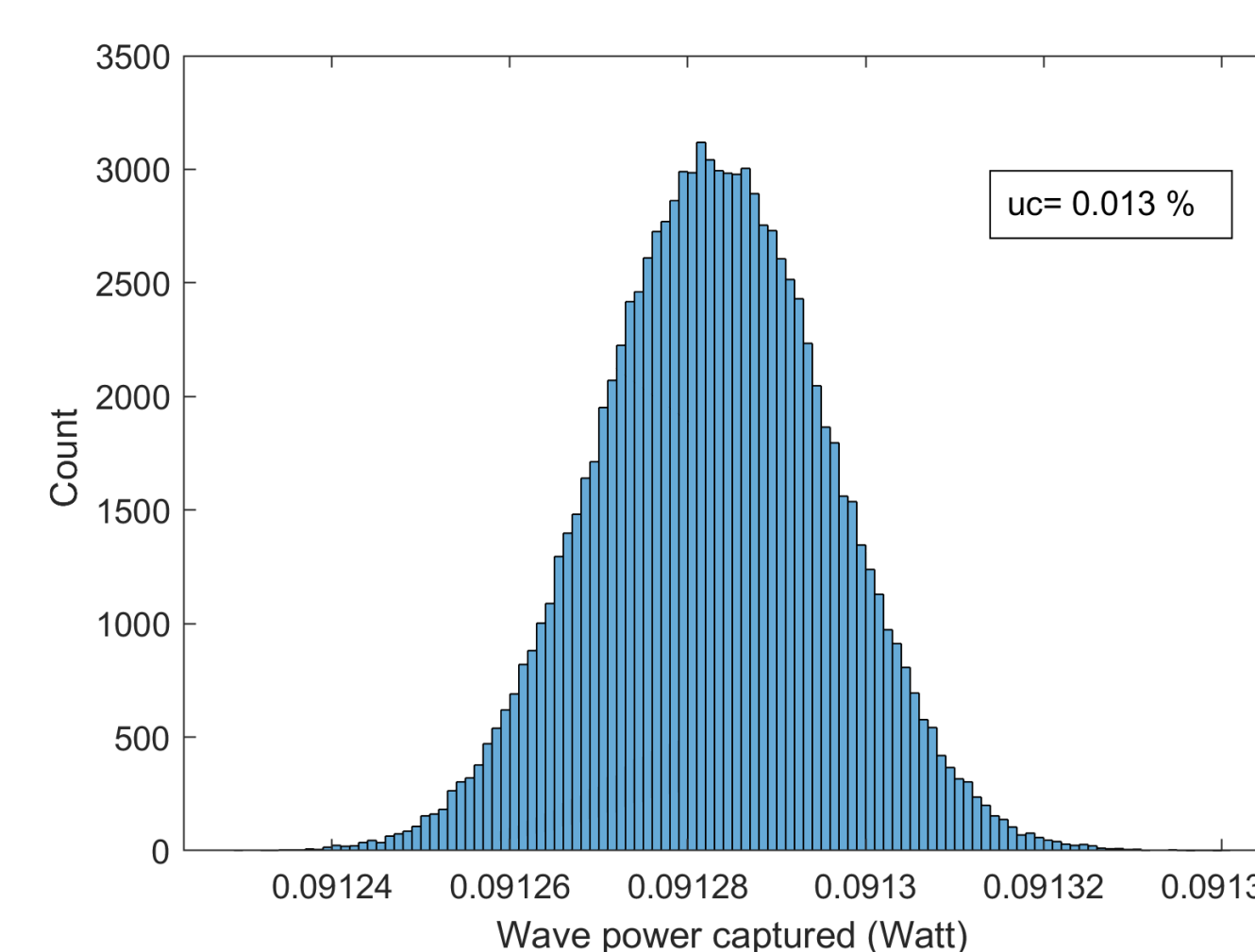
1. What are the main factors and causes of uncertainties in the laboratory studies of a multibody floating wave energy converter?
2. What lab-testing methodologies can be developed to minimise these uncertainties?
3. What are the main factors that influence the reproducibility of WEC experiments?



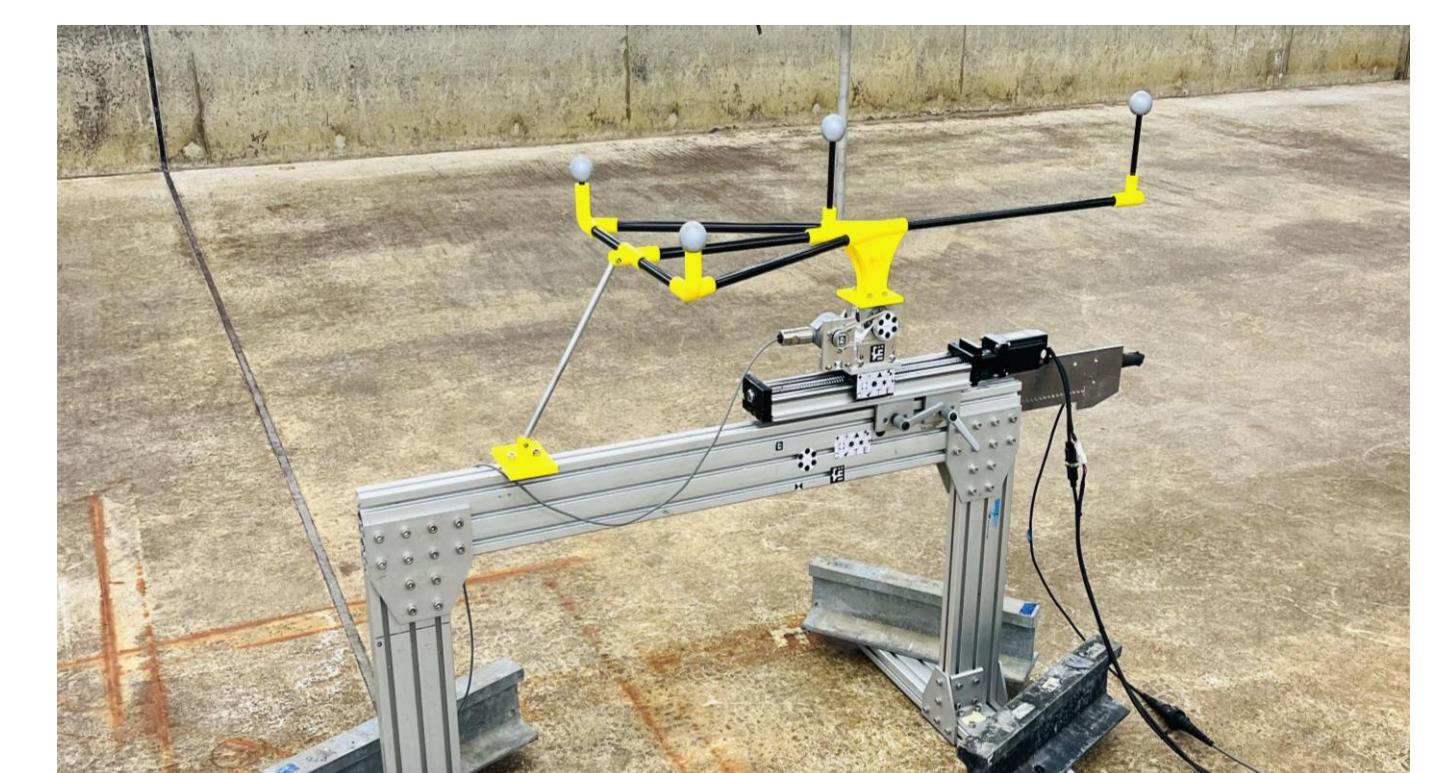
Monte Carlo method of error propagation



Power captured for the tested wave frequencies



Normal distribution of power capture values from MCM Error propagation with 100000 iterations

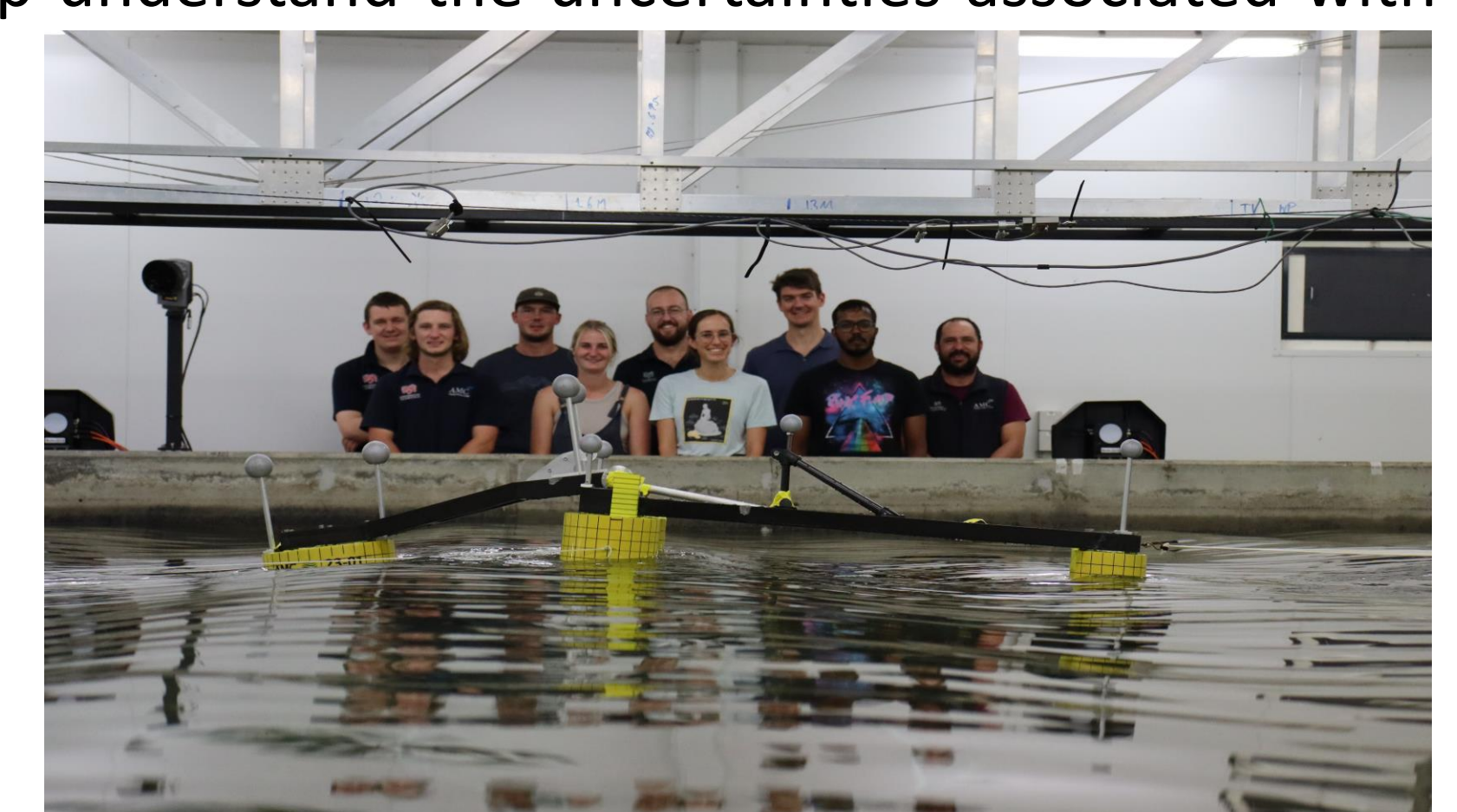


Experimental setup for quantifying uncertainties of Qualisys system used for measuring motions

Research Outputs and impacts

- Future researchers and experimenters can improve the quality of model studies thereby minimizing the time and risk involved in developing WECs .
- Existing guidelines and standards of WEC model studies can be refined to have more detailed uncertainty analysis.
- Comparisons of the model study with field data from Blue Economy CRC M4 WEC deployment in Albany can help understand the uncertainties associated with the scale.

Project partners



M4 Experiment team from AMC and UWA