



Development of a Deep Water Wave Generator for the DTU Wave Flume

Type of project: BSc or MSc

Project description:

The Department of Mechanical Engineering at the Technical University of Denmark has a range of water tank facilities capable of generating surface waves. The existing paddle wave generators in these tanks are well-suited to the shallow-water wave generation required for experimental studies of sediment transport and coastal protection. However, they experience difficulties in generating accurate deep-water waves of the type required to test marine renewable energy devices such as wave energy absorbers and floating wind turbines. Funding has been granted to design and build a pair of removable, wedge-shaped wave generators capable of producing high quality deep water waves. This equipment will thereby improve the accuracy of wave generation for research purposes. Furthermore, the second machine, identical to the first, will be constructed as a wave energy absorber. This device will be used for educational purposes to enhance the understanding of ocean wave energy extraction amongst engineering students, practising marine engineers, and renewable-energy developers.

The analysis, design and construction of the first wave maker prototype was carried out during the period 2015-2017, and we are looking for interested students to contribute to the final design as part of their Bachelor or Master's thesis project. Depending on the background and interests of the student, possible projects could include one or more of the following topics:

- Numerical analysis of the generator using linearized potential flow calculations to characterize and optimize the exact shape and size of the wedge. Characterization of the nonlinear behaviour of the generator via fully nonlinear potential flow calculations. Development of an optimal control strategy for producing high-quality nonlinear waves.
- Mechanical design of the device, development of technical drawings and construction of the first device.
- Testing of the generator in the wave flume and comparison with numerical predictions.

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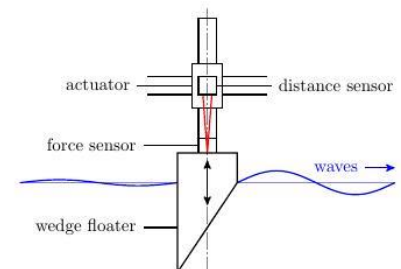


Figure 2: The wedge wave-generator concept.