

INTERACT-Waves4Power – Simulation model for assessment of interaction effects between wave energy converters

(Scientific fields: Naval architecture, Renewable energy)

Background and motivation

A few full-scale single-unit wave energy converter (WEC) prototypes have been deployed in the ocean. Further commercialisation requires installation of many WECs in array systems. The upscaling to array systems is a challenge due to interaction effects between WECs and their subcomponents. New design and assessment methods are needed which together with advanced simulation models can be used to

design array farms accounting for interaction effects for optimum system performance e.g. power, fatigue life, levelised cost of energy (LCoE).



Objectives and goals of the project

The thesis project contributes to the development of such design methods and models. This thesis will study Waves4Power's concept WaveEL (see the figure) by doing simulations of different array configurations. The hydrodynamic performance and electricity production will be compared for a variety of installation and operation conditions, e.g., bathymetry, wave scatter diagram, and layout of the array farms.

Methods and tools

The DNV-GL software SESAM will be used to model and do the numerical simulations. The array farm layouts will be discussed with the company Waves4Power. The simulations will be carried out in the frequency-domain, and if time allows for in the thesis project, also a selection of fully coupled simulations in the time-domain will be carried out.

The project can be carried out by one student.

The thesis should be written in Word using a template provided by the department.

The MSc thesis project should incorporate (at least) the following tasks:

- Literature study.
- Collection of Metocean data for candidates to installation sites that will be used in the numerical simulations.
- Further development of an existing simulation model of the Waves4Power concept.
- Frequency-domain simulations of several array farms.
- (If time allows for) Fully coupled simulations in the time-domain.
- Parametric studies.
- Write a thesis report and present it on a public seminar.

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