

Training course on: “**Numerical and Experimental Modelling of Wave Energy Converters**”

Aalborg University (AAU)

January 6th – 17th 2020

Description:

The work to develop wave energy converters (WECs) typically involves intensive laboratory model testing in wave tanks and/or flumes at the earlier stages, and intensive testing and monitoring of prototypes in real seas at later stages. During the various development steps numerical modeling offers possibilities of investigation of larger parameter ranges than allowable in experimental modeling, and is therefore an essential tool for optimization.

When working with optimization of the power performance of a wave energy device, the control hereof, via the power take-off system is of paramount importance.

The course is split into 3 modules (ECTS: 6).

Course Outline

Module 1: General introduction, experimental modeling and testing:

The objective of the first module of the course is to introduce and apply wave analysis theory, laboratory measuring techniques, prototype monitoring and control. The module will include class room lectures, laboratory exercises in the wave tanks/flumes and a visit to a wave energy test installation in real sea.

This module will include the following subjects:

- Wave analysis
- Measuring techniques for waves, loadings and power take-off
- Analysis of laboratory and real sea data for performance evaluation

Module 2: Numerical modeling:

The objective of the second module of the course is to introduce and getting experience with running numerical models of WECs including modeling of PTO and its control. The module will include class room lectures and exercises.

This module will include the following subjects:

- The state of the art of numerical modeling for WECs
- Limitations of these techniques and the existence of other numerical approaches for hydrodynamic modeling
- Development of a numerical wave to wire model

Module 3: WEC control and experimental implementation:

The objective of the third module of the course is to go through the basics of control of WECs (based on wave activated bodies) and work its way through to more complex control approaches. The module will include class room lectures, laboratory exercises in the wave tanks/flumes.

This module will include the following subjects:

- Model Identification strategy for WECs
- Control of wave energy devices
- Implementation of WEC control methods in experimental testing

Organised by:

- Wave Energy Research Group at Aalborg University (AAU), Department of Civil Engineering.

Teaching staff:

- Francesco Ferri (AAU)
- Jens Peter Kofoed (AAU)

Venue:

- AALBORG UNIVERSITY, Thomas Manns Vej 23, 9220 Aalborg, Denmark

Please be aware that minor internal changes could occur prior to the begin of the course.