



Politecnico
di Torino



Nonlinear model of a floating wave energy converter for the international collaborative study EIA-OES Task 10

Thesis proposal at the Marine Offshore Renewable Energy Lab

Department of Mechanical and Aerospace Engineering, Politecnico di Torino

👤 Recommended profile:

Mechanical engineering, Mechatronic engineering, Aerospace Engineering

📍 Topics involved:

Mathematical modelling; Nonlinear hydrodynamic modelling; Wave energy conversion

🔍 Skills required or suggested:

Matlab

Proposal description

The International Energy Agency Technology Collaboration Programme for Ocean Energy Systems (OES) initiated the OES Wave Energy Conversion Modelling Task, which focused on the verification and validation of numerical models for simulating wave energy converters (WECs). The long-term goal is to assess the accuracy of and establish confidence in the use of numerical models used in design as well as power performance assessment of WECs. To establish this confidence, the authors used different existing computational modelling tools to simulate given tasks to identify uncertainties related to simulation methodologies: (i) linear potential flow methods; (ii) weakly nonlinear Froude–Krylov methods; and (iii) fully nonlinear methods (fully nonlinear potential flow and Navier–Stokes models).

The purpose of this thesis is to refine the expand the implementation of a computationally efficient nonlinear Froude-Krylov model, to be compared with experimental data obtained from the Aalborg Wave Tank. Wave excitation tests are first considered, with eventual expansion to free decay and wave excitation. Potentially, results may be compared with WEC-Sim implementation, performing mesh convergence and sensitivity tests.

Relevant references: [paper](#), [toolbox](#), and [WEC-Sim](#)

✉ Contact references:

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