



Introduction to BenchWEC project

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UCC

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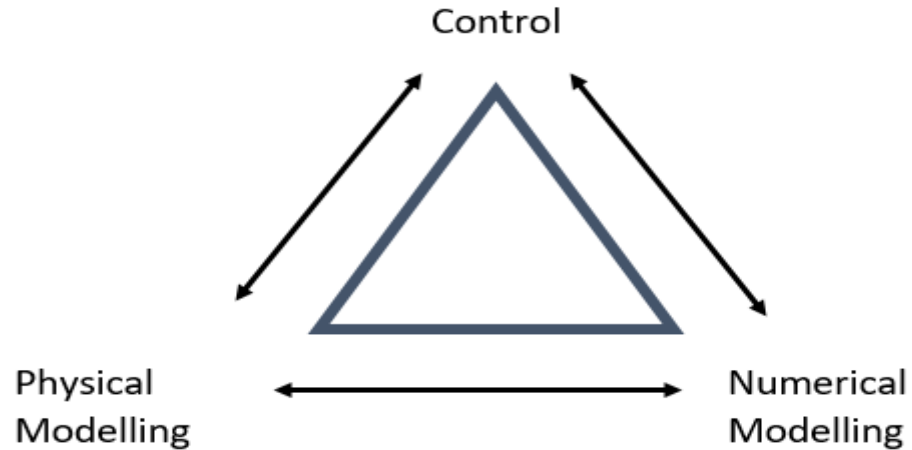


**Maynooth
University**
National University
of Ireland Maynooth



Context

Need for standardised and open data sets



Objectives

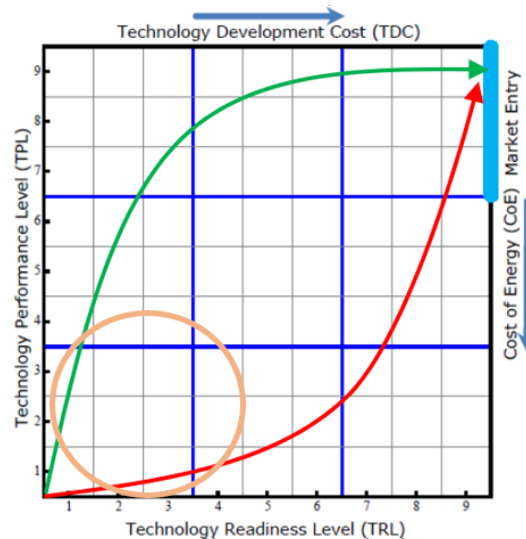
Produce data sets on two WECs:

- A rigid type device
 - In 2018
 - Work in progress: choice of a concept and early developments
 - Complete specifications to be disclosed soon
- A flexible type device
 - In 2019

Process and results to be published openly.

Benefits of the project

$$\text{Simplified LCOE} = \frac{\text{Total amount of money invested (€)}}{\text{Total amount of power generated (kW)}}$$



Experimental infrastructure



DEEP OCEAN BASIN – 35M X 12M X 3M DEEP

suitable for circa. 1/15 scale operational conditions and 1/50 scale survival waves. Equipped with 16 hinged force feedback paddles capable of a peak wave generation condition of $H_s = 0.6\text{m}$, $T_p = 2.7\text{s}$ and $H_{\text{max}} = 1.1\text{m}$.

Experimental infrastructure

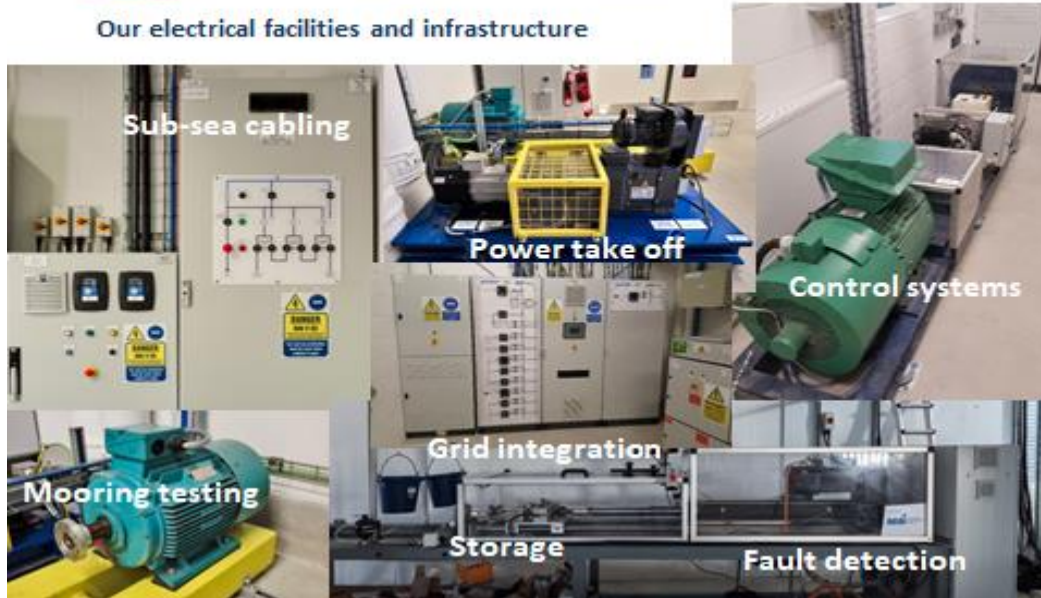


OCEAN BASIN – 25M X 18M X 1M DEEP

It has capacity for adding a 2.5m deep section and it can produce real and simulated sea states. The wave generation peaks at $H_s = 0.16\text{m}$, $T_p = 1.4\text{s}$ and $H_{\text{max}} = 0.32\text{m}$.

Electrical infrastructure

Our electrical facilities and infrastructure



Micro grid emulation capabilities.

Enabling complete wave to wire model.

Imposing realistic grid related constraints on Control algorithms.

Numerical tools

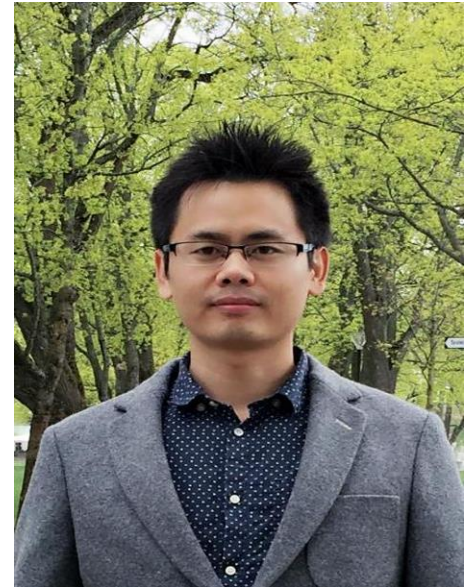
Use and contribute to existing free softwares:

- Nemoh BEM solver
 - Current work in progress on the optimization of Nemoh
 - <https://github.com/mancellin/capytaine>
- WEC-SIM simulation package
 - To be compared with other open source WEC simulation tools

Objective: assess the reliability of existing open source numerical tools

Control of the WEC

LiGuo Wang, upcoming postdoc at COER Maynooth.



Team and calendar

Post-docs: Brian Flannery (UCC), Matthieu Ancellin (UCD), LiGuo Wang (Maynooth)

PI's: John Ringwood (Maynooth), Frederic Dias (UCD), Tony Lewis, Jimmy Murphy & Gordon Lightbody (UCC)

Year 1 (2018): Development of first device and test in wave basin.

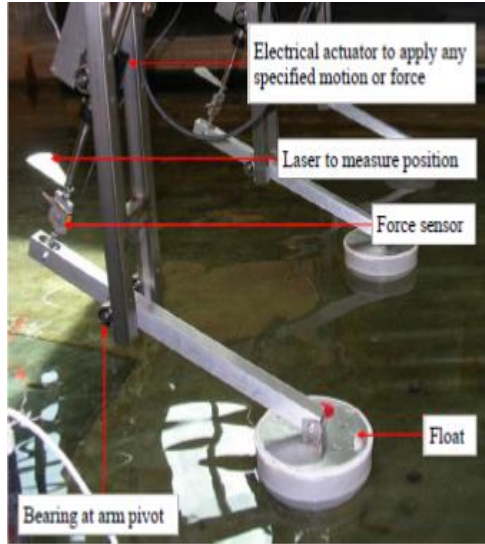
Year 2 (2019): Likewise for second device.

Thank you for your attention



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Examples of high end models (linear PTO)

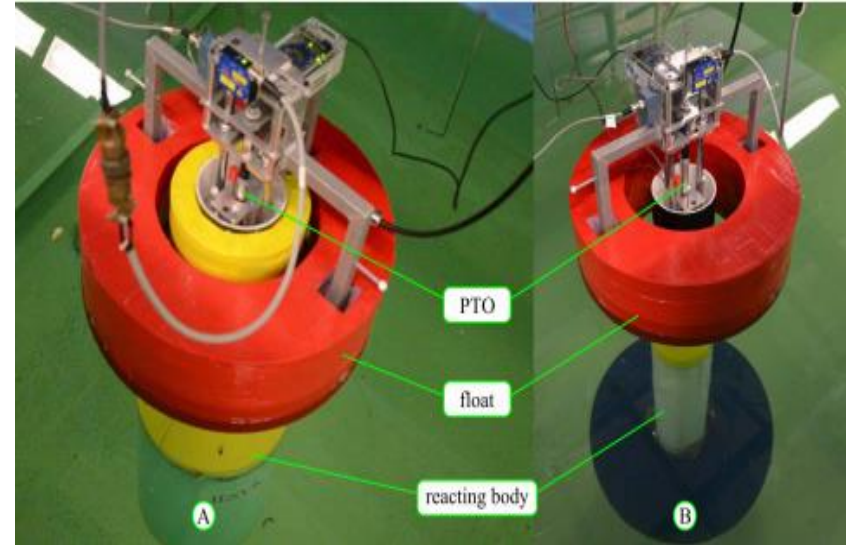


Wavestar

SRPA (Wavebob, OPT etc)

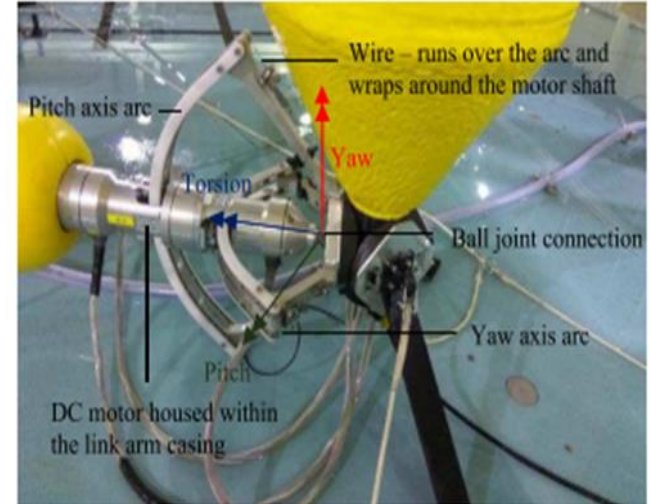
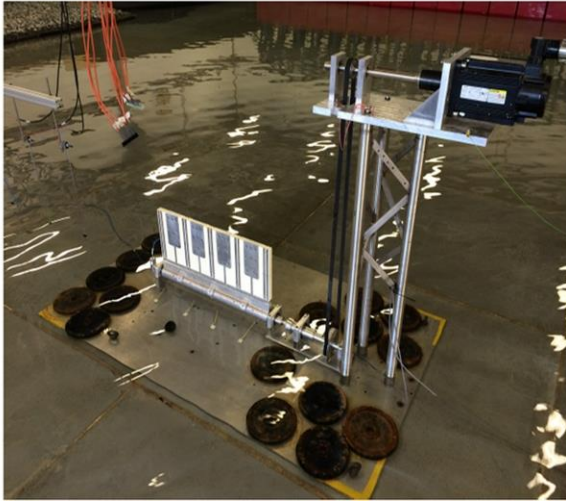
(Zurkinden, Kramer, & Alves, 2012)
(Beatty, 2015)

(Todalshaug et al., 2015)



Corpower

Examples of high end models (rotational PTO)



Oyster (OSWC)
Squid(WaveNET)

(Crooks, Hoff, Folley, & Elsaesser, 2017)
(Mcdonald et al., 2017)

CETO

(O'Brien, 2014)