



Maritime DTU
Center for Maritime Activities

Energy harvesting based on ship motions

Type of project: MSc

Project description:

The harvesting of energy from ocean waves is well-known, but relatively little has been done to investigate how the kinetic energy associated with wave-induced ship motions can be harvested. This study should explore the energy extraction potential from wave-induced ship motions, considering ships sailing in a seaway. The study will make use of an in-house numerical tool, OceanWave3D (<https://gitlab.gbar.dtu.dk/oceanwave3d>).

Earlier related studies have investigated energy harvesting based on electromagnetic induction using linear generators (Nielsen et al., 2024). This project will focus on another concept, the *oscillating water column* (OWC), as this technology has been shown to be relatively effective in classical wave energy conversion studies (Nielsen and Bingham, 2015; Babarit, 2017).

Familiarization with OWC is expected (e.g., Bhattacharyya, 1978), like knowledge and skills related to numerical ship hydrodynamics will be needed (e.g., Newman, 2017).

Babarit, A. (2017). *Wave Energy Conversion – Resource, Technologies and Performance*. Elsevier.

Bhattacharyya, R. (1978). *Dynamics of Marine Vehicles*. John Wiley & Sons.

Newman, J.N. (2017). *Marine Hydrodynamics*. The MIT Press. (online edition available)

Nielsen, K., Bingham, HB. (2015). *MARINET experiment KNSWING testing an I-Beam OWC attenuator*. International Journal of Marine Energy 12, pp. 21-34.

Nielsen, U.D, Bingham HB, Bjørk R. (2024). *Energy extraction potential from wave-induced ship motions using linear generators*. Sustainable Energy Technologies and Assessments 70, art. 103946.

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