



Maritime DTU
Center for Maritime Activities

Hydrodynamic Response and Power Capture of a Mechanically Coupled Multi-Float Wave Energy Converter

Type of project: MSc

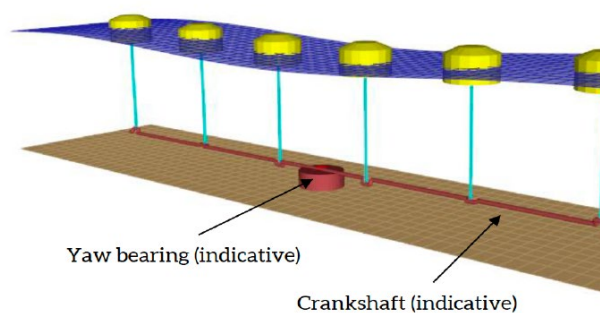
Project description:

The Wellenbaur wave energy converter consists of multiple wave-driven floats arranged longitudinally in the direction of wave propagation. Each float is connected by a flexible tension-only tether to an individual crank on a common crankshaft, thereby combining the phase-shifted motions of spatially distributed floats into a common power take-off (PTO).

The main research question is: How do the number and spatial arrangement of mechanically coupled floats influence the hydrodynamic response, phase relationships and power-capture potential of a longitudinal multi-float WEC with a common crankshaft? A numerical model will investigate the number of floats, their longitudinal positions relative to wavelength, the overall array length, hydrodynamic interactions and the resulting float-motion amplitudes and phases.

The baseline tension-only coupling should be represented, while the detailed crank geometry is not intended to be optimized at this stage. The common crankshaft and PTO may initially be represented by a simplified mechanical model. Regular waves will be used first to identify the dominant relationships between wavelength, float configuration, phase and power capture; selected irregular sea states may be considered if the scope permits.

Particular attention will be given to power capture and capture width in relation to overall device length. Existing Wellenbaur numerical and experimental results may be used as reference data. The outcome will be a hydrodynamic design basis identifying the parameters and interactions with the strongest influence on phase relationships and power capture, supporting subsequent optimization of the crank mechanism, PTO and overall system.



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