



Maritime DTU
Center for Maritime Activities

Optimization of an efficient wave energy buoy concept, which is close to commercialization

Type of project: BSc or MSc

Project description:

RESEN WAVES has developed an efficient small-scale 300W wave energy buoy which is able to work in full ocean exposure. It will serve the commercial application of powering instruments and machinery in the sea and act both as power and communication platform for remote offshore applications. The buoy is tension moored to the sea bed and consists of a U-shaped streamlined float and a spring loaded cylindrical drum which turns forth and back with the wave action and activates the generator. Sea trials were conducted in 2017 in the sheltered waters of Nissum Bredning. They show room for further improvement of the hydrodynamic behavior of the buoy. The buoy does not always automatically orient itself towards the waves, for maximum power absorption, and it is unclear how the combination of float and cylinder influences the power take off. A numerical model of the buoy is needed in order to optimize the shape of the buoy, the depth of the cylinder relative to the float and the buoyancy ratio between the float and the drum.

The buoy is small enough to be operated in a flume as well as in the sea. During operation all physical parameters like torque, rpm, mechanical and electric power can be logged at high rates. Resen Waves will provide full engineering and workshop assistance for design changes and for flume and sea tests.

Depending on the background and interests of the student, possible projects could include one or more of the following topics:

- Numerical analysis of the buoy behaviour and optimization of different shapes of float when the cylindrical drum geometry is known. Streamlined flat bottom floats are preferred for ease in production.
- Optimization of pre-tensioning of the mooring line for maximum power take off in a variety of wave heights and wave periods and geometries of float and drum.
- Testing of the buoy in a wave flume and comparison with numerical predictions as well as real sea trials.



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