Institut für Regelungstechnik
Leibniz Universität Hannover

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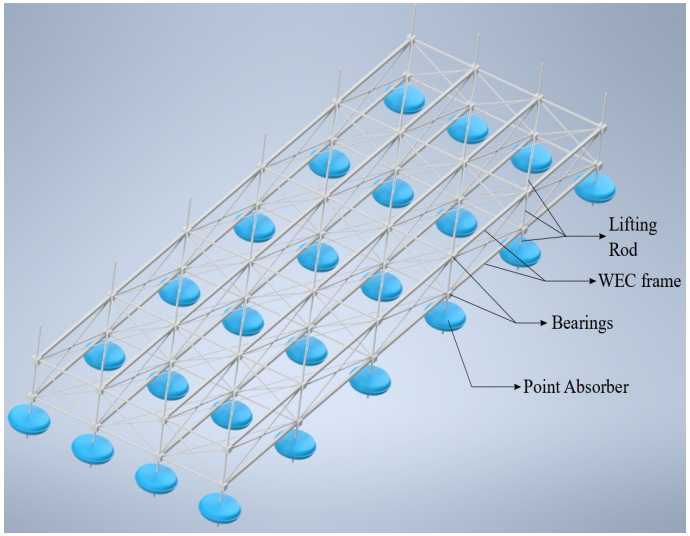
Masterthesis

Model Predictive Control for Wave Energy Converters

Due to growing global energy demands and climate concerns, a combination of various renewable energy sources will be necessary in the future. Energy capture from ocean waves, with an estimated potential of about 32000 TWh/a, has the capability to play a crucial role in meeting these demands. Despite this enormous potential, there is still no market-ready wave energy converter (WEC) system to harvest the waves' energy. Since the overall system's effectiveness crucially depends on the power takeoff (PTO) and its control, the aim of this thesis is to develop a model predictive control (MPC) algorithm for this task.

This research direction focuses on WEC systems that consist of an array of multiple point absorbers. For each point absorber, the incoming waves induce a movement relative to the frame, which can be used to harness energy. A simulation model of a point absorber WEC has been developed at the Ludwig-Franzius-Institut and shall be used to assess the performance of the MPC algorithm. To tackle this problem, an MPC for a single point absorber shall be developed and implemented first. Thereafter, the MPC will be extended to control the whole WEC system.

Candidate students should have have good mathematical background in systems and control theory (RT I, RT II) and some prior knowledge in model predictive control, preferably attended the lecture on MPC.



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