

Consultancy Project

WAVE POWER SYSTEM SIMULATIONS



Power take-off systems

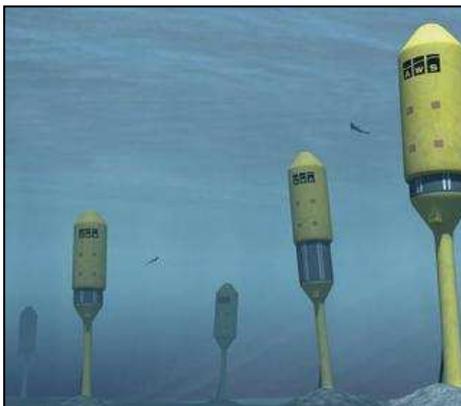
Wave power take-off systems are an exciting new development in the renewable energy sector. Various different designs exist. Some devices are completely submerged and utilize pressure changes or underwater currents caused by passing waves, while others float on the surface. All PTOs rely on the relative motion of two or more bodies for energy generation. They feature a hydraulic circuit in which linear actuators act as pump, and a hydraulic motor drives an electric generator. The main design challenge is to efficiently convert irregular, slow, high-force motion into useful unidirectional rotary motion for power production.



Our activities

We are proud to be actively involved with the development of this new technology by working together with various leading companies in the UK and overseas. Main tasks are the verification of hydraulic circuits, component sizing, CFD analysis, system simulation, and controller design.

Analysing such complex systems involves interdisciplinary research. Not only the hydraulics play an important role, but structural dynamics, hydrodynamic interactions between buoy and waves, and load characteristics of generators connected to an electrical grid must be considered, too. For our customers it is therefore an enormous advantage that we can call upon the expertise in other university departments to solve problems in these specific areas.



Future work

Research and development is ongoing. The current designs must be tested and optimised, which may include the performance enhancement of specific marine environment seals, development of high torque pumps and motors with low part-load losses, investigation of using sea water as working fluid, and intelligent rectification and control.

The PTMC strives to be a distinguished centre of excellence for wave power technology. The combination of our expertise with the innovative ideas of our customers will establish wave power in the market and make it a serious competitor for other renewable energy technologies.