

TETHYS ENGINEERING BLAST



6 December 2019

[Tethys Engineering](#) is an online knowledge base that facilitates the exchange and dissemination of information on the technical and engineering aspects of marine renewable energy. The bi-weekly *Tethys Engineering Blast* highlights new publications in the [Tethys Engineering Knowledge Base](#); relevant announcements, opportunities, and upcoming events; and news articles of international interest.

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Announcements

Prize Competitions

The [Powering the Blue Economy: Ocean Observing Prize](#), a joint prize between the Water Power Technologies Office at the U.S. Department of Energy and the Integrated Ocean Observing System program at the National Oceanographic and Atmospheric Administration, is now open. Submissions for the first of a series of competitions, which seeks novel concepts that integrate ocean observing technologies with marine energy systems to address end-user needs, are due 12 February 2020. An [introductory webinar](#) will be held 13 December 2019 at 9:00 am PST.

The Water Power Technologies Office at the U.S. Department of Energy has launched the second stage of the [Waves to Water Prize](#), which seeks to accelerate technology innovation in wave energy powered desalination systems. Submissions are due 13 March 2020. An [introductory webinar](#) will be held 13 December 2019 at 11:00 am PST.

MHK Graduate Student Research Program

The U.S. Department of Energy's Water Power Technologies Office and Oak Ridge Institute for Science and Education (ORISE) are accepting applications for the [Marnie and Hydrokinetic Graduate Student Research Program](#). Applications are due by 9 December 2019 at 5:00 pm EST.

MTSJ Special Issue

The Marine Technology Society Journal (MTSJ) is accepting manuscript submissions for a [special issue](#) entitled, *Utilizing Offshore Resources for Renewable Energy Development*. The deadline for manuscript submissions is 22 June 2020.

Upcoming Events

Upcoming Webinars

The National Renewable Energy Laboratory (NREL) will be hosting a Marine and Hydrokinetic Data Repository submission training webinar on 11 December 2019 at 3:00 pm ET. Sign up for the webinar [here](#).

The Ocean Energy Research Association (OERA) will be hosting a [webinar](#) entitled, “Developing Enhanced Marine Operations (DEMO) in High Flow Tidal Environments” from 1:00-2:00 pm AST on 12 December 2019. Register [here](#).

Upcoming Conferences

The [American Geophysical Union \(AGU\) Fall Meeting](#) will be held in San Francisco, California on 9-13 December 2019.

[Underwater Intervention \(UI\)](#) will be held in New Orleans, Louisiana on 4-6 February 2020.

New Documents on *Tethys Engineering*

[Assessing extreme loads on a tidal turbine using focused wave groups in energetic currents](#) – Draycott et al. 2019

Tidal stream turbines are subject to large hydrodynamic loads, including those induced by extreme waves. Scale model testing in the laboratory plays an important role in ensuring that full scale tidal turbines are designed and operated in a manner that is appropriate for harsh ocean environments where waves and tidal currents coexist. For the first time, a fully-instrumented scaled tidal turbine is tested in short-duration focused wave groups representative of extreme environmental load cases expected at energetic tidal sites. In this paper, the subsequent variations in rotor-based loads, power and blade root bending moments are reported.

[Experimental investigations on the performance of a fixed-oscillating water column type wave energy converter](#) – Çelik and Altunkaynak 2019

A comprehensive experimental investigation was performed for a bottom-fixed oscillating water column to determine the influence of the underwater opening height of

the chamber, power take-off damping and wave steepness on the energy converter efficiency. A broad range of opening heights and power take-off dampings was utilized in physical experiments under various wave steepness values. Water column displacements, velocities and motion behaviors were also examined. Optimal orifice ratios were determined to obtain maximum efficiency under different wave steepness values.

[A review of research on the closed thermodynamic cycles of ocean thermal energy conversion](#) – Liu et al. 2019

This paper presents a review of the research on closed thermodynamic cycles of ocean thermal energy conversion (OTEC) system, including a description of thermodynamic cycles with either pure or mixture working fluids, and describes the effects of various working fluids on cycle efficiency. For cycles with pure working fluids, the efficiency changes due to change in the evaporation and condensation temperature caused by heat resource differences. For cycles with mixture working fluids, the efficiency may be improved by a number of techniques, such as heat recovery of ammonia-depleted solution and the intermediate extraction regeneration.

[Multi-fidelity optimization of blade thickness parameters for a horizontal axis tidal stream turbine](#) – Kumar et al. 2019

Cross-sectional geometry of a horizontal axis tidal stream turbine (HATST) blade was optimized using surrogate models and computational fluid dynamics (CFD) analysis. The blade thickness parameters of a 100 kW class HATST model, i.e., relative thickness and maximum relative thickness location, were varied to examine change of turbine performance in terms of power coefficient. Multiple surrogates such as response surface approximation, radial basis function, Kriging and weighted average surrogates were implemented to the CFD analysis results with design parameter variation to search the optimal design.

[Acoustic Emission Technology for Engineering Health Monitoring of a Wave Energy Converter](#) – Walsh 2018

Condition monitoring techniques designed for the wave energy industry and utilising the water that surrounds the devices could reduce maintenance costs by decreasing human intervention and the early detection of faults and degradation. This thesis looks to explore the feasibility of underwater Acoustic Emission (AE) monitoring as a method of condition-based maintenance for wave energy converters and other marine energy devices. This is achieved through three strands of work: sea trials, component testing and propagation modelling.

[Investigation of the reduced specific energy consumption of the RO-PRO hybrid system based on temperature-enhanced pressure retarded osmosis](#) – Wang et al. 2019

Reverse osmosis (RO) has been widely used as a dominant desalination technology to produce fresh water from seawater (SW), but still consumes huge energy. To reduce the

energy consumption of RO, pressure retarded osmosis (PRO) has been developed to extract osmotic energy from RO brine. In this study, the PRO process is optimized for efficient energy recovery from RO brine via one system/module-level mathematic model in RO-PRO hybrid system. The system-level model illustrates that the specific energy consumption (SEC) of the hybrid system can be significantly reduced when achieving a high permeate flow under high operating pressure in PRO.

News & Press Releases

[Blue-GIFT Supports Nine Ocean Energy Companies to Trial and Validate Their Technologies](#) – European Marine Energy Centre (EMEC)

The first call for applications of the €2.5 million Blue-GIFT (Blue Growth and Innovation Fast Tracked) project led by EMEC, ended in September with a successful outcome for nine companies. Funded by Interreg Atlantic Area, the Blue-GIFT project is a coordinated ocean energy technology demonstration programme, encouraging longer-term demonstration and technology de-risking across the Atlantic Area regions. The 1st call offered support package vouchers to ocean energy companies for access to Blue-GIFT test and demonstration sites across the Atlantic Area for validation of their technologies in real sea environments.

[Swansea Bay tidal lagoon: Last-ditch bid to resurrect project](#) – BBC

The company behind the stalled Swansea Bay tidal lagoon is making a last-ditch attempt to resurrect the project. Plans for what would be the world's first tidal power lagoon were thrown out by the UK government last year. Tidal Power plc's chief executive Mark Shorrock said the five-year planning consent awarded by the government in 2015 expires in June 2020 "unless material works have commenced". He said the company was trying to raise £1.2m to start work on land. The company will not be able to start work in the sea because it has not got a marine licence from Natural Resources Wales (NRW).

[Offshore and subsea specialists plunge into wave power sector](#) – Wave Energy Scotland

Firms from the subsea and offshore engineering sectors were among the winners in a Europe-wide call to find new technologies to quickly and easily connect wave energy devices at sea. In what could be a game changer for Scotland's wave energy industry, this call from Wave Energy Scotland will award contracts to firms keen to bolster their involvement in the renewables sector. Aberdeen-based offshore engineers Apollo, subsea specialists SRP and electrical components provider Ditrel Industrial feature in the seven winning projects totalling around £460,000 as part of a £2 million plus 'Quick Connections System' Wave Energy Scotland (WES) innovation workstream.

[Wavepiston and Fiellberg Wrap Up Eurostars LOCWEC Project](#) – Marine Energy

Fiellberg, supplier of hydraulic cylinders, and Wavepiston, developer of the Wavepiston wave energy converter, have worked together in the Eurostars LOCWEC project on improving the control of the loads on the Wavepiston energy collectors. The improved load control system will be demonstrated in relation to two full-scale projects. One at Plocan, Gran Canaria, supported by EU's Horizon 2020 SME Instrument, and one at a small tourist island, Isola Piana, Sardinia, supported by EU's Horizon 2020 Fast Track to Innovation Programme.

Funded Projects Commence Under the Marine Institute's SmartBay National Infrastructure Access Programme (NIAP) 2018 - SmartBay

Seven successful applicants were awarded funding under the Marine Institute's SmartBay National Infrastructure Access Programme (NIAP) following the 2018/2019 funding call. The awardees will receive support of approximately €25,000 per project to trial and validate their technology and/or gain access to the relevant data feeds to carry out scientific research at the SmartBay Marine and Renewable Energy Test Site. The call was open to both academia and industry, and other relevant organisations, on the island of Ireland, to access the SmartBay test site and subsea observatory.