

TETHYS ENGINEERING BLAST



22 November 2019

The bi-weekly *Tethys Engineering Blast* highlights new publications on *Tethys Engineering*, opportunities in marine renewable energy, and news articles of international interest. We hope you find this a valuable resource to keep you connected to new research, opportunities, and industry milestones.

Announcements

Tethys Engineering Photo Library

The [Tethys Engineering Photo Library](#) hosts photos and illustrations of marine renewable energy devices, arrays, and facilities that have been graciously provided by several developers and are available for free third party use. Be sure to take a look through the library for images for your next presentation!

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.

Call for Abstracts

The abstract submission deadline has been extended for the [International Conference on Ocean Energy \(ICOE\)](#) in Washington, D.C. on 19-21 May 2020. Abstracts for proposed panels, oral presentations, and posters can now be submitted until 22 November 2019 at 11:59 pm EST.

Upcoming Events

Upcoming Webinar

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

Upcoming Conferences

The inaugural [Pan American Marine Energy Conference \(PAMEC\)](#) will be held in San Jose, Costa Rica on 26-28 January 2020. Registration fees increase on 1 January 2020.

[Ocean Sciences 2020](#) will be held in San Diego, California on 16-21 February 2020. Registration fees increase on 9 January 2020.

New Documents on *Tethys Engineering*

[Hydrodynamic response and power efficiency analysis of heaving wave energy converter integrated with breakwater](#) – Reabroy et al. 2019

The hydrodynamic and power capture performance of an asymmetric floating device called “Dolphin” wave energy converter (WEC) integrated with a fixed breakwater has been proposed. The operation of the floating WEC device is restricted to the vertical direction called heaving motion. In this research, the theories of heaving motion, wave energy conversion, and computational fluid dynamics (CFD) were studied. The Dolphin WEC model with breakwater integration at experimental scale was built and tested in wave tank at Harbin Engineering University under various wave conditions.

[Comparison of synthetic turbulence approaches for blade element momentum theory prediction of tidal turbine performance and loads](#) – Togneri et al. 2020

Turbulence is a crucial flow phenomenon for tidal energy converters (TECs), as it influences both the peak loads they experience and their fatigue life. To best mitigate its effects we must understand both turbulence itself and how it induces loads on TECs. To that end, this paper presents the results of blade element momentum theory (BEMT) simulations of flume-scale TEC models subjected to synthetic turbulent flows. This study

employs two synthetic turbulence generation methods: the synthetic eddy method and the spectral Sandia method.

Optimization of module pressure retarded osmosis membrane for maximum energy extraction – Chen et al. 2019

A full-scale Pressure Retarded Osmosis process (PRO) is optimized in non-ideal operating conditions using Grey Wolf Optimization (GWO) algorithms. Optimization process included the classical parameters that previous studies recommended such as operating pressure, and feed and draw fractions in the mixture solution. The study has revealed that the recommended operating pressure $\Delta P = \Delta\pi/2$ and the ratio of feed or draw solution to the total mixture solution, ~ 0.5 , in a laboratory scale unit or in an ideal PRO process are not valid in a non-ideal full-scale PRO module.

Validation of a CFD-based numerical wave tank model for the power production assessment of the wavestar ocean wave energy converter – Windt et al. 2020

CFD-based numerical wave tank (CNWT) models, are a useful tool for the analysis of wave energy converters (WECs). During the development of a CNWT, model validation is vital, to prove the accuracy of the numerical solution. This paper presents an extensive validation study of a CNWT model for the 1:5 scale Wavestar point-absorber device. In this study, the PTO is represented as a linear spring-damper system, providing a good approximation to the full PTO dynamics.

Influences of winglets on the hydrodynamic performance of horizontal axis current turbines – Yiru et al. 2019

A novel tidal turbine with winglet is given, and the influences of winglets on the hydrodynamic performance of horizontal axis current turbines (HACT) are investigated. The incompressible Reynolds-Averaged Navier–Stokes (RANS) Equations with the $k - \omega$ shear stress transport (SST) turbulence model are solved. Two HACTs with the winglet that bent towards the pressure side or suction side are designed as the conceptual designs. The pressure distribution and tip vortices are analyzed and compared to investigate the effect of the winglets.

Techno-economic analysis of closed OTEC cycles for power generation – Bernardoni et al. 2019

This study aims at offering a techno-economic evaluation of closed OTEC cycles for on-shore installations. A flexible Matlab® suite has been developed to identify plant design parameters (temperature difference of cold and warm seawater, pinch-point temperature difference of evaporator and condenser etc.) that guarantee the maximum value of γ (ratio between electricity output and heat exchangers area). The obtained LCOE (269 €/MWh) confirms how OTEC technology is not ready to compete in energy market.

News & Current Events

[Eco Wave Power enters Assembly Phase of the Jaffa Port Project](#) – Eco Wave

Eco Wave Power (EWPG Holding AB) commenced the assembly phase of the hydraulic land-located conversion unit for its first grid connected installation in Israel. This will be the first time that wave energy will connect to the national electric grid in Israel and a special Feed in Tariff (FIT) shall be determined for such purpose. The hydraulic works are expected to be finalized within 30 days. Once hydraulic works are finalized, Siemens will commence the electric installation works. Eco Wave Power is expected to initially install 1-2 large scale floaters, and after that install the full amount.

[SIDS DOCK and Naval Energies to Develop OTEC Deep-Sea Conversion and Floating Wind Projects for Small Island Developing Nations](#) – Naval Energies

SIDS DOCK, the United Nations (UN)-recognized Small Island Developing States (SIDS) Sustainable Energy and Climate Resilience Organization and Naval Energies, an industrial leader in the Marine Renewable Energies sector, signed a Memorandum of Understanding to support the development of Ocean Thermal Energy Conversion (OTEC) Deep-Sea Conversion plants and Offshore Floating Wind projects in the SIDS. Through this partnership, both SIDS DOCK and Naval Energies will closely cooperate with regional organizations, the small island countries and the renewable energies stakeholders to promote the development of projects.

[Wave Energy Tech Is Ready to Plug Into a Real Grid](#) – IEEE Spectrum

In Hawaii, the OceanEnergy Buoy is slated to connect to the island of Oahu's electric grid next month. The 749-metric-ton device was recently towed from Portland, Ore., to the U.S. Navy's Wave Energy Test Site, where the bright yellow buoy will undergo a year of performance tests. The project builds on a decade of research and several smaller iterations, including a quarter-scale model that was tested for three years in Ireland's Galway Bay. The 1.25-megawatt buoy will be moored to a 60-meter-deep berth and should withstand gale-force winds and extreme waves.

[NEMOS Wave Energy Converter Testing Underway](#) – NEMOS

NEMOS has successfully started testing its 2019 Wave Energy Converter (WEC) prototype in Ostend, Belgium. Following a series of handling and installation tests, the machine was finally deployed at its mooring system 500 m off the coast of Ostend in October. The process went smoothly when the self-floating system was towed by a tugboat and coupled to its anchor lines. During the operation, the WEC functioned as planned and important data was gathered. Due to adverse weather forecasts, the WEC was recovered to shore at the beginning of November.

[JFMS Mermaid Software to Support CorPower Wave Energy Ops](#) – Marine Energy

Swedish wave energy developer CorPower Ocean has become the latest renewables operator to adopt Mermaid software to assess weather risk and accurately plan its construction and operation and maintenance activities. CorPower will use the software to support decision-making in the early planning stage at the HiWave 5 Demonstrator Project that, ultimately, will lead to significant long-term cost savings. Developed by James Fisher Marine Services (JFMS) the software is said to be one of the most sophisticated marine operation planning tools available, already used by the likes of Vattenfall and wpd in support of offshore projects.