TETHYS ENGINEERING BLAST

10 April 2020

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.

Announcements

Call for Abstracts

The 7th PRIMaRE (Partnership for Research In Marine Renewable Energy) Conference is now accepting abstracts submissions until 17 April 2020. The conference will be held online from 7-8 July 2020, with no charge for attendance.

Funding Opportunities

The U.S. Department of Energy's Water Power Technologies Office has issued a funding opportunity, entitled "Marine Energy Foundational Research and Testing Infrastructure", to build marine energy research capabilities and leverage expertise to help the developing marine energy industry tackle complex scientific and technical problems. Concept papers are due 11 May 2020 and full applications are due on 7 July 2020. A prerecorded informational webinar will be available for viewing on 15 April after 15:00 ET to provide information to potential applicants.

The Supergen Offshore Renewable Energy (ORE) Hub has extended its second round of Flexible Funding, which will award a total of up to £1.2 million to seed areas that complement existing research, fill gaps, or add cross cutting activities to explore the transfer of research findings between sectors within ORE. Expressions of Interest must now be submitted by 17 April 2020 at 17:00 GMT.

The Blue-GIFT (Blue Growth and Innovation Fast Tracked) project has announced the 2nd call for applications. The project aims to help Atlantic Area companies test the next generation of MRE technology in real sea environments. Applications close 30 April 2020 at 17:00 UTC.

The Selkie Project has extended its call for tidal and wave energy developers to tender their services to validate multi-use engineering tools, templates, standards, and models, which can be used across the sectors in both Wales and Ireland. The new deadline for applications is now 30 April 2020.

Employment Opportunities

Minesto is seeking a Civil Subsea Engineer to assist in the design and development of subsea systems, foundations, anchoring and mooring systems, connections, umbilical and risers. Applications close 28 April 2020.

The University of Exeter is seeking a PhD Candidate to support fundamental research in the field of reliability engineering, component testing, and performance assessment for tidal energy technologies. Applications close 30 April 2020.

Carnegie Clean Energy is seeking a Hydrodynamic Engineer, Electrical Machine Expert, and a Machine Learning Expert to join the technical team and work closely with engineers across a broad range of disciplines in executing the development of the CETO wave energy technology.

Upcoming Events

Event Updates

The MaRINET2 short course, *Installation and O&M of Offshore Renewable Energy Systems*, originally scheduled for mid-May 2020 in Viana do Castelo, Portugal, has been postponed. New dates have not been announced.

The Asian Wave and Tidal Energy Conference (AWTEC 2020), originally scheduled for November 2020 in Hobart, Australia, has been postponed. New dates for the conference will be announced at a later date.

New Documents on *Tethys Engineering*

Tidal stream turbine control: An active disturbance rejection control approach – Zhou et al. 2020

> In this paper, the active disturbance rejection control (ADRC) approach is proposed to replace proportional-integral (PI) controllers in the conventional generator-side control scheme. In this approach, two ADRC schemes (cascaded and second order ADRC strategies) are respectively applied and compared to achieve MPPT under current

velocity and turbine torque disturbances. Performances of the proposed ADRC approaches are compared to PI and sliding mode control strategies. Energy production during swell wave disturbance is also evaluated under these control strategies.

Comparison of Numerical Methods for Modeling the Wave Field Effects Generated by Individual Wave Energy Converters and Multiple Converter Wave Farms – McNatt et al. 2020

This numerical study compares the wave field generated by the spectral wave action balance code, SNL-SWAN, to the linear-wave boundary-element method (BEM) code, WAMIT. The objective of this study is to assess the performance of SNL-SWAN for modeling wave field effects produced by individual wave energy converters (WECs) and wave farms comprising multiple WECs by comparing results from SNL-SWAN with those produced by the BEM code WAMIT.

Bio-inspired Nanocomposite Membranes for Osmotic Energy Harvesting – Chen et al. 2020

Osmotic energy represents a widespread and reliable source of renewable energy with minimal daily variability. The key technological bottleneck for osmotic electricity is that membranes must combine highly efficient ion rectification and high ionic flux with long-term robustness in seawater. Here, we show that nanocomposite membranes with structural organization inspired by soft biological tissues with high mechanical and transport characteristics can address these problems.

Efficiency evaluation of a ductless Archimedes turbine: Laboratory experiments and numerical simulations – Zitti et al. 2020

The aim of designing a new hydrokinetic turbine simple, cheap, environmentally friendly and suitable for installation in remote areas is pursued by studying the efficiency of an Archimedes turbine that exploits the kinetic energy of a water stream rather than an upstream-downstream difference in water head. First, the efficiency of a hydrokinetic Archimedes turbine has been studied using laboratory experiments for low TSR regimes. Subsequently, numerical simulations have been run to evaluate the performance coefficient and to extend the TSR range.

Experimental investigation on the hydrodynamic performance of a cylindrical dual-chamber Oscillating Water Column device – Ning et al. 2020

The hydrodynamic performance of a stationary cylindrical dual-chamber Oscillating Water Column (OWC) wave energy device was experimentally studied to assess conversion efficiency in comparison with a single-chamber OWC. The effects of various parameters including wave steepness, the opening ratio, the inner- and outer-chamber drafts on the hydrodynamic efficiency of the proposed OWC device were considered. It was found that the hydrodynamic efficiency of the dual-chamber OWC device increases by comparison with the single-chamber one.

Maximum efficiency point tracking for an ocean thermal energy harvesting system – Xia et al. 2020

> This paper has designed a new ocean thermal energy conversion system which using phase change material as energy storage medium, and proposed a novel maximum efficiency point tracking (MEPT) method for energy conversion. This new method, which is integrated with a radial basis function neural network (RBFNN), particle swarm optimization (PSO) and the proportion integration differentiation (PID) control method, could effectively improve the efficiency of energy conversion.

News & Press Releases

DOE and NOAA Announce 11 Winners of the Powering the Blue Economy™ Ocean Observing Prize – DOE

> The U.S. Department of Energy (DOE), in partnership with the National Oceanic and Atmospheric Administration (NOAA), recently announced the 11 winners of the first DISCOVER, stage of the Powering the Blue Economy™: Ocean Observing Prize. The competition is designed to spur technology innovation, allow for easier and/or cheaper data collection across the 80% of the world's oceans that remain unexplored, and contribute to the growth of the blue economy. Of the selected winning teams, 10 will receive $10,000 each, and the grand prize winner, CalWave Power Technologies Inc., will receive $25,000.

WaveBoost project improves performance and reliability of wave energy – CorPower Ocean

> The three-year Horizon 2020 funded WaveBoost project has drawn to a close with a step change improvement achieved to the reliability and performance of wave energy technology. Led by CorPower Ocean, the WaveBoost consortium designed and developed an advanced Power Take Off (PTO) system allowing wave energy converters (WECs) to operate safer and more reliably in harsh ocean conditions while increasing annual electricity production by 27%.

Wave Swell Energy advancing King Island project – Offshore Energy

> Wave Swell Energy (WSE) pilot-scale wave energy converter project off the coast of King Island, Tasmania is moving forward with pontoons now in place for final assembly and the superstructure well on its way to completion. Australian company said earlier it is still on schedule to install the WEC by the middle of 2020. The $12.3-million project involves the design, construction, installation and operation of the UniWave 200, a 200 kW wave energy device.

A wave-powered ferry aims to forge a new path for shipping in the Philippines – Mongabay

A Filipino marine engineer is building a hybrid trimaran, powered by both a traditional motor and wave energy, as an alternative to the decades-old shipping vessels that ply transnational routes in the Visayas region in the Philippines. The trimaran transforms waves into energy through double-action hydraulic pumps integrated in its outriggers. As the pumps move through the waves, they generate electricity that provides auxiliary power to the vessel, which is driven primarily by a regular gasoline motor.

COVID-19: Bombora delays mWave deployment – reNEWS

Wave energy company Bombora has delayed the planned deployment of its mWave demonstration system in Wales to 2021 due to the coronavirus pandemic. It said that with supplier workshops currently shut the delay to the 1.5MW Pembrokeshire project off Wales was necessary. Bombora added it was confident installation would be possible in the first half of next year. The mWAVE system is a membrane style wave energy converter located 10 metres beneath the ocean's surface, similar to a fully submerged reef. It is invisible from the shore said Bombora.