TETHYS ENGINEERING BLAST

13 September 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

New *Tethys Engineering* Blast

Following the launch of *Tethys Engineering*, we are excited to release the inaugural edition of the *Tethys Engineering* Blast. We have automatically subscribed individuals currently subscribed to the *Tethys* Blast, with the hope that the *Tethys Engineering* Blast serves as an additional resource to keep you connected to the marine renewable energy community. If you would like to unsubscribe from the *Tethys Engineering* Blast, you may update your preferences here.

Call for Abstracts

Abstracts are being accepted for the International Conference on Ocean Energy (ICOE) in Washington D.C. on 19-21 May 2020. The event will showcase innovations in ocean energy technology research and development, prepare ocean renewable energy to benefit the larger "Blue Economy" and the electrical grid, and identify research needed to further advance the state of the technology. Abstracts for poster and oral presentations are due by 11 October 2019 and can be submitted here.

Marine Energy Collegiate Competition

The U.S. Department of Energy (DOE) recently announced the first Marine Energy Collegiate Competition (MECC) designed to challenge interdisciplinary teams of undergraduate and graduate students to offer unique solutions to the burgeoning marine energy industry. The inaugural MECC will be held in conjunction with the International Conference on Ocean Energy (ICOE) in Washington, DC on 19-20 May 2020. An informational webinar will be held 3 October 2019, which you can register for here. Applications are due 18 October 2019.

Funding Opportunity

Wave Energy Scotland has launched a call for feasibility studies on Quick Connection Systems (QCS). The overall objective of the QCS programme is to reduce the duration, cost, and risk of offshore operations for early stage wave energy converters. This call focuses on the technology and operations used to make the connection between a wave energy device and its moorings and/or electrical system. Applications are due by 16 September 2019. More information on the application process can be found here.

Upcoming Events

Upcoming Conferences

Energy3 Canada will be held in Halifax, Nova Scotia on 16-18 October 2019. Registration is still open and the full preliminary agenda is available here.

OCEANS 2019 Seattle will be held in Seattle, Washington on 27-31 October 2019. Early bird registration is available until 16 September 2019.

New Documents on *Tethys Engineering*

Modelling of a wave energy converter array with a nonlinear power take-off system in the frequency domain – Wei et al. 2019

> This paper presents a nonlinear frequency domain model and uses this to assess the performance of a wave energy converter (WEC) array with a nonlinear power take-off (PTO). In this model, the nonlinear PTO forces are approximated by a truncated Fourier series, while the dynamics of the WEC array are described by a set of linear motion equations in the frequency domain, and the hydrodynamic coefficients are obtained with the boundary element method.

Unsteady hydrodynamics of a full-scale tidal turbine operating in large wave conditions – Scarlett et al. 2019

> Tidal turbines operate in a highly unsteady environment, which causes large-amplitude load fluctuations to the rotor. This can result in dynamic and fatigue failures. Hence, it is critical that the unsteady loads are accurately predicted. A rotor's blade can experience stall delay, load hysteresis and dynamic stall. Yet, the significance of these effects for a full-scale axial-flow turbine are unclear. To investigate, we develop a simple model for the unsteady hydrodynamics of the rotor and consider field measurements of the onset flow.

Theoretical and experimental research on the thermal performance of ocean thermal energy conversion system using the rankine cycle mode – Chen et al. 2019

In this paper, theoretical analysis of an ocean thermal energy conversion (OTEC) system was conducted using the Rankine cycle based on the first law of thermodynamics and a mathematical model of components of the system was established. Efficiencies of six types of working fluids were evaluated and compared under the uniform conditions. Finally, a 15 kW OTEC plant using the Rankine cycle was constructed and change rules of the thermal cycle efficiency were obtained with various parameters.

Development and validation of a regional-scale high-resolution unstructured model for wave energy resource characterization along the US East Coast – Allahdadi et al. 2019

Leveraging the high-performance computing capability at one of the US Department of Energy's National Laboratories, an ultra-high-resolution Simulating WAves Nearshore (SWAN) model suitable for wave energy project feasibility studies is developed for the US East Coast Region. The present study focuses on the development and validation of this ultra-high resolution large-scale model, including source model selection, sensitivity studies, and model performance evaluation for a wave energy resource characterization application.

Velocity and performance correction methodology for hydrokinetic turbines experimented with different geometry of the channel – Patel et al. 2019

The aim of the present work is to study the influence of channel geometrical parameters on the performance of Savonius type hydrokinetic turbine and to present velocity correction methodology to determine the actual performance of the turbine. In the present experimental work, the effect of geometry of channel bottom and channel side wall distance on the performance of a Savonius turbine is investigated. Elevated channel bottom (hump) enhances the velocity of flow by reducing the depth of flow.

Modelling and optimization of modular system for power generation from a salinity gradient – Altaee and Cipolina 2019

Pressure retarded osmosis has been proposed for power generation from a salinity gradient resource. To date, pressure retarded osmosis optimization and operation is based on parametric studies performed on laboratory scale units, which leaves a gap in our understanding of the process behaviour in a full-scale modular system. A computer model has been developed to predict the process performance. Process modelling was performed on a full-scale membrane module and impact of key operating parameters such as hydraulic feed pressure and feed and draw solution rates were evaluated.

News & Current Events

Plans Announced to Build the World's Largest Ocean Powered Data Centre in Caithness, Scotland – SIMEC Atlantis

SIMEC Atlantis Energy Limited ("Atlantis"), the global developer, owner and operator of sustainable energy projects, has announced ambitions for a tidal-powered data centre in the Caithness region of Scotland. The power supply for such a data centre would include electricity supplied via a private wire network from tidal turbines at the existing MeyGen project site. This would be the first ocean powered data centre in the world, with the potential to attract a hyperscale data centre occupier to Scotland.

Wave energy technology trialed off Tasmanian coast – Australian Renewable Energy Agency

On behalf of the Australian Government, the Australian Renewable Energy Agency (ARENA) has today announced $4 million in funding to Wave Swell Energy Limited to install a pilot-scale wave energy converter off the coast of King Island, Tasmania. The $12.3 million project will involve the design, construction, installation and operation of the UniWave 200, a 200 kW wave energy device off the coast of King Island. The project will also be integrated with the King Island microgrid operated by Hydro Tasmania, which received $6 million in ARENA funding in 2011.

France Energies Marines Secures €4M Funding – Marine Energy

The French Prime Minister has agreed to continue funding for France Energies Marines, the Institute for Energy Transition (ITE) dedicated to marine renewable energies. This support from the State, through the Investments for the Future Program, will see France Energies Marines receive initial financial support of 4 million euros over 2 years, allocated to a new budget managed by the National Research Agency. The recognition in ITE and the allocation of this amount constitute a considerable lever for the realization of shared R&D programs within France Energies Marines.

Promising tidal energy site north of Darwin mapped – AUSTEn

A promising tidal energy site in the Clarence Strait, 50 km north of Darwin, NT, has been mapped in detail by the Australian Tidal Energy (AUSTEn) project. To help understand the site's suitability for tidal energy extraction, factors including tidal speeds, bathymetry, water temperature and seabed composition were characterised during a week-long field campaign in May. The Clarence Strait is one of two locations that AUSTEn prioritised for tidal energy generation; the first was Tasmania's Banks Strait, which was the subject of a similar field campaign in 2018.

EMEC and Enel Green Power Sign Memorandum of Understanding on Marnie Energy - EMEC

The European Marine Energy Centre (EMEC) and Enel Green Power SpA (EGP) have signed a Memorandum of Understanding (MoU) with the aim to encourage knowledge sharing in marine energy technology development and performance assessment, and to drive forward collaborations in marine energy demonstration projects. The partnership

will address a gap in independent marine energy testing against international standards, the development of which would increase credibility and trust in the sector.