

## 10<sup>th</sup> PRIMaRE Conference and CCP-WSI Focus Group Workshop

Building 3WN, University of Bath, UK

This is a hybrid conference, anyone who is not able to attend the conference in person, please join

**Zoom Meeting:** <https://bath-ac-uk.zoom.us/j/5890782958?pwd=d25LUExS3pTRzVvTzh0YzZOL1lnQT09>

Meeting ID: 589 078 2958

Passcode: 123245

### 27<sup>th</sup> June 2023

8:45-9:15 Arrival and registration (Building 3WN foyer)

9:15-9:30 Welcome & Introduction (PRIMaRE Chair, Jun Zang, Room 3WN2.1)

#### **Session 1 Offshore wind (Room 3WN2.1)**

9:30-9:50 *An overview of the Cornwall FLOW Accelerator and PDZ project outputs, and the implications for FLOW in the Celtic Sea*

Keynote speaker: Steve Jermy (Celtic Sea Power)

9:50-10:02 *Floating Wind Turbine Maintenance by Rapid Swap and Tow*

Marcin Kapitaniak (University of Aberdeen)

10:02-10:14 *Conceptual design and optimisation of a novel hybrid device for capturing offshore wind and wave energy*

Emilio Faraggiana (Politecnico di Torino)

10:14-10:26 *New Investigations on Wave Loading on Offshore Wind Turbine Foundations*

Haoyu Ding (University of Bath)

10:26-10:38 *Review of Analysis Methods for Floating Offshore Wind Turbines under Extreme Environmental Conditions*

Lige Zhao ((University of Plymouth)

10:38-10:50 *An experimental investigation of nonlinear wave loading on a vertical cylinder - Stokes type expansion and secondary load cycle*

Tianning Tang (University of Oxford)

10:50-11:10 Poster presentations

Rachael Smith (Cardiff University)

Emma Edwards (University of Plymouth)

Simone Michele (University of Plymouth)

Deepak George (Swansea University)  
Guangwei Zhao (University of Strathclyde)  
Ioannis Polydoros (Swansea University)  
Nicholas Petzinna (University of the Highlands and Islands)  
Huaqing Jin (University of Plymouth)  
Zhixin Zhou (University of Bristol)

11:10-11:40 Coffee break and poster displays (Room 3WN3.7)

**Session 2 Tidal energy (Room 3WN2.1)**

11:40-12:00 *Tidal Stream Energy: Converting the Opportunity - The TIGER Project a Review of the Achievements*

Keynote speaker: Simon Cheeseman (ORE Catapult)

12:00-12:12 *Development of a passive blade-pitch mechanism to reduce the loads on a tidal turbine in high-flow conditions*

Tom Summers (University of Edinburgh)

12:12-12:24 *Cross-comparison of the prediction of resource and turbine fatigue loading at a tidal site from models and multi-point measurements*

Hannah Mullings (The University of Manchester)

12:24-12:36 *Deep Learning for optimal usage of battery storage coupled with tidal farms*

Anna Young (University of Bath)

12:36-12:48 *Are Vortex Generators of interest for tidal turbine blades? A proof-of-concept study*

Marinos Manolesos (City University of London)

12:48-13:00 *Investigating the impact of multi-rotor structure shadowing on tidal stream turbine performance*

Bryn Townley (University of Edinburgh)

13:00-14:00 Lunch and poster displays (3WN3.7)

**Session 3 Design tools and methods in marine renewable energy (3WN2.1)**

14:00-14:20 *Why test? What should govern the choice of a test site and testing regime?*

Keynote speaker: Stephen Thompson (META)

14:20-14:32 *A new robotic investigative tool to aid geotechnical design of offshore renewables: the ROBOCONE*

James Creasey (University of Bristol)

14:32-14:44 *Numerical Study of Wave Interaction with Multiple Floating Buoys by qaleFOAM*

Yi Zhang (City University of London)

14:44-14:56 *High-fidelity multi-region overset mesh Computational Fluid Dynamics model for offshore renewable energy*

Zaibin Lin (University of Aberdeen)

14:56-15:08 *Identifying risk of conflict between fisheries and potential marine renewable energy sites*

Matt Lewis (Intertek & Bangor University)

15:08-15:20 *Numerical Simulation of a floating solar farm in waves*

Yujia Wei (Cranfield University)

15:20-15:40 Poster presentations

Krishnendu Puzhukil (University of Plymouth)

Junxian Wang (Cranfield University)

Daniel Coles (University of Plymouth)

Chris Pierpoint (Seiche Limited)

Jon Hardwick (University of Exeter)

K.Thiruvenkatasamy (Bangor University)

Xuxin Pooley (University of Exeter)

Rongquan WANG (dalian University of technology)

Yi Huang (University of Strathclyde)

Deri Lamb (ORE Catapult – Wales)

Jonathan Payman (ORE Catapult – Wales)

15:40-16:10 Coffee break and poster displays (3WN3.7)

#### **Session 4 Challenges and opportunities in marine renewable energy (3WN2.1)**

16:10-16:30 *Multi Purpose Interconnectors and Energy Islands: The next stage in offshore wind*

Keynote speaker: Paul Taylor (Intertek)

16:30-17:30 Panel discussions

17:45 –19:00 Skyline walk to Bath Central and conference dinner

19:30 **Conference dinner (DoubleTree by Hilton Hotel Restaurant)**

**28<sup>th</sup> June 2023**

## **Session 5 Wave energy**

9:00-9:20 *Research and development of wave energy technology at Mocean Energy*

Keynote speaker: Alfred Cotton (Mocean Energy)

9:20-10:35 *Motion behavior and wave power absorption of multi-degree-of-freedom floating oscillating water column (OWC) devices*

Peiwen Cong (Dalian University of Technology)

9:32-9:44 *Improving WEC Power Performance through Wave Channel Optimisation Approaches*

Nian Liu (Mocean Energy / University of Edinburgh)

9:44-9:56 *Optimising the Oscillating Water Column (OWC) to enhance wave energy extraction*

Bashir Ahmed (University of Bath)

9:56-10:08 *Mooring design for field demonstration of a large-scale wave energy converter*

Faryal Khalid (University of Exeter)

10:08-10:20 *Wave power extraction from a floating elastic disk-shaped wave energy converter*

Siming Zheng (University of Plymouth)

10:20-10:50 Coffee break and poster displays (3WN3.7)

## **Session 6 Resources and environments (3WN2.1)**

10:50-11:10 *Offshore Renewable Energy Research: Supergen ORE Hub*

Keynote speaker: Deborah Greaves (University of Plymouth)

11:10-11:22 *The expansion of offshore windfarms: implications for ecosystem services*

Claire Szostek (Plymouth Marine Laboratory)

11:22-11:34 *Deriving Spatial Wave Data from a Network of Buoys and Ships*

Jiaxin Chen (University of Exeter)

11:34-11:46 *Investigating the contribution of contaminants by offshore wind farms to the marine environment and implications for aquaculture co-location*

Gordon Watson (University of Portsmouth)

11:46-11:58 *An end-to-end approach to estimate Significant Wave height from marine X-band radar backscatter by using deep convolution neural networks*

Vahid Seydi (Bangor University)

11:58-12:10 *Satellite wave data for a surrogate wave model for the marine operations of offshore wind farms*

Sophie Whistler (University of Exeter)

- 12:10-12:20 Poster and Oral Presentation Prizes  
12:20-12:25 PRIMaRE Chair hand-over to University of Southampton  
12:25-12:30 Closing Remarks

**12:30-13:30 Lunch (3WN3.7)**



**14:00-16:45 CCP-WSI + Focus Group Workshop 4 (3WN2.1)**

The CCP-WSI Focus Group Workshop 4 is an industrial engagement event hosted by the CCP-WSI, focussing on offshore renewable energy applications. The Workshop will bring together CCP-WSI project partners with representatives from the wider WSI Community to develop a priority list of WSI challenges and inform future targeted focus group meetings. The ultimate goal is to develop a roadmap for CCP-WSI activities and inform future funding calls.

[https://ccp-wsi.ac.uk/events/industry\\_engagement/focus\\_group\\_workshop\\_4/](https://ccp-wsi.ac.uk/events/industry_engagement/focus_group_workshop_4/)

14:00-14:15 Welcome and introduction to CCP-WSI

14:15-14:35 *Floating wind turbines – opportunities, challenges and numerical analysis*

Keynote speaker: Alex Argyros (BP Offshore Wind)

14:35-14:55 *Numerical modelling for floating offshore wind turbines*

Keynote speaker: Francesc Fabregas (DNV GL)

**14:55-15:15 Coffee break (3WN37)**

15:15-15:35 *Better ocean characterisation needed for marine renewables and offshore aquaculture: coupled wave-current mean flows*

Keynote speaker: Matt Lewis (Intertek Water & Energy)

15:35-15:55 *WES driving innovation and cross-sector collaboration*

Keynote speaker: Jonathan Hodges (Wave Energy Scotland)

15:55-16:45 Panel Discussions

16:45 Close

## Poster Presentations

### 10:50-11:10 Session 1

1. Impact of lateral turbine spacing on the performance of a multi-rotor tidal energy device  
Rachael Smith (Cardiff University)
2. Key trends in the evolution of floating offshore wind platform designs  
Emma Edwards (University of Plymouth)
3. Floating elastic circular plate in ocean waves  
Simone Michele (University of Plymouth)
4. Computational damage modelling of flexible wave energy convertors  
Deepak George (Swansea University)
5. Recent experimental wave load study on bottom fixed vertical cylinder study at the Kelvin Hydrodynamics laboratory  
Guangwei Zhao (University of Strathclyde)
6. A CFD framework for simulating site-specific tidal and wind turbine arrays  
Ioannis Polydoros (Swansea University)
7. Using low resolution multibeam imaging sonar data to investigate animal underwater behaviour  
Nicholas Petzinna (University of the Highlands and Islands)
8. Low-frequency energy capture and water wave attenuation of a hybrid WEC-breakwater with nonlinear stiffness  
Huaqing Jin (University of Plymouth)
9. Review on determination of thermal soil properties to optimize submarine cable design  
Zhixin Zhou (University of Bristol)

### 15:20-15:40 Session 3

10. Hydro-elastic response of flexible membrane exposed to regular waves  
Krishnendu Puzhukkil (University of Plymouth)
11. Simulation of pivot location impact on passive hydrofoil in regular wave  
Junxian Wang (Cranfield University)
12. Enhancing energy system security using tidal stream energy  
Daniel Coles (University of Plymouth)
13. Underwater sound measurements of the Nova Innovation tidal turbine array at Bluemull Sound, Shetland Islands  
Chris Pierpoint (Seiche Limited)
14. Impact of wave conditions on siting of tidal stream energy arrays

- Jon Hardwick (University of Exeter)
15. Numerical Modelling on Scour Around a Circular Pile Due to Wave Induced Current in the swash zone  
K.Thiruvenkatasamy (Bangor University)
  16. Towards the modelling, control and optimization of wave energy converter arrays  
Xuxin Pooley (University of Exeter )
  17. Dynamic performance of a land-based OWC device under the action of solitary wave  
Rongquan Wang (Dalian University of Technology)
  18. Experimental Measurement on Water Focusing with Underwater Structure  
Yi Huang (University of Strathclyde)
  19. Natural phasing of tidal stream and tidal range  
Deri Lamb (ORE Catapult – Wales)
  20. The MEECE buoy - a versatile marine test platform  
Jonathan Payman (ORE Catapult – Wales)

## Keynote speakers for the 10<sup>th</sup> PRIMaRE Conference



**Name:** Commodore (Rtd) Steven Jermy RN - Celtic Sea Power

**Bio:** An offshore renewable energy leader, Steve is: CEO at Celtic Sea Power; Non-Executive Director on the Cornwall & Isles of Scilly LEP; represents the Celtic Sea Cluster on the UK's Offshore Wind Industry Cluster Group. His offshore experience includes ships' diving, fishery protection, offshore aviation, sea training and sea command. He has worked for Mojo Maritime Ltd and James Fisher Group plc, on the installation and operation of offshore wind, tidal and wave energy devices and led six major offshore renewables R&D projects. Between 2019 and 2021, he oversaw the conversion of a Cornish offshore test & demonstration zone to floating offshore wind, and its sale in 2021 to Hexicon for the installation of the first floating offshore wind project in the Celtic Sea. He now leads Celtic Sea Power, an arm's length Cornwall Council owned company, with the mission of making floating offshore wind an economic development success for Cornwall and the Celtic Sea Region. Steve has a BSc in Applied Maths and Physical Oceanography from Bangor University, a MPhil in International Relations with International Economics from Cambridge University, is the author of *Strategy for Action: Using Force Wisely in the 21<sup>st</sup> Century*, and is a Fellow of the Nautical Institute and the Institute of Marine Engineers, Scientists and Technologists.

**Title:** *An overview of the Cornwall FLOW Accelerator and PDZ project outputs, and the implications for FLOW in the Celtic Sea*



**Name:** Simon Cheeseman – ORE Catapult

**Bio:** Simon Cheeseman is an experienced programme manager, having worked in both the private and public sectors. Working within the Offshore Renewable Energy Catapult's Strategy & Emerging Technology Directorate, Simon manages the Catapult's activities in the Southwest focusing on accelerating the deployment of floating wind into the Celtic Sea. Simon sits on the Celtic Sea Cluster Board. Prior to working with ORE Catapult, Simon was the Marine Programme Manager for the Energy Technologies Institute based in Loughborough, England. During his career Simon has held various senior manager roles with responsibility for high value technology development projects.

**Title:** *Tidal Stream Energy: Converting the Opportunity - The TIGER Project a Review of the Achievements*





**Name:** Stephen Thompson - META

**Bio:** Stephen has worked in the marine industry throughout his career, from education to commercial marine aquaculture, fisheries and conservation. Immediately prior to coming to Pembrokeshire, Stephen spent some years observing the development of the offshore wind industry in the southern North Sea, and was involved in assessing and commenting on marine licence applications and EIAs for those project. As META Project Delivery Manager he is responsible for building on the success of META as Wales' flagship test centre.

**Title:** *Why test? What should govern the choice of a test site and testing regime?*



**Name:** Paul Taylor - Intertek

**Bio:** Paul is Intertek's modelling team leader, with 25+ years' experience in marine, coastal and estuarine environmental consultancy. After gaining his MSc in Physical Oceanography at Bangor University, he initially worked on offshore geophysical surveys, and then as a marine environmental modelling consultant for BMT and then Metoc (now Intertek Energy and Water), undertaking a varied range of hydrodynamic and water quality modelling assessments for numerous clients and projects in the water and energy sectors, including offshore wind and marine renewables. Paul worked for Geoscience Australia for about a year in 2010 as a Project Leader, looking how climate change might affect the risk and impact of natural hazards such as tsunamis and storm surge.

**Title:** *Multi Purpose Interconnectors and Energy Islands: The next stage in offshore wind*



**Name:** Alfred Cotton – Mocean Energy

**Bio:** Since completing his PhD in wave energy in 2019 at the University of Edinburgh, Alfred has continued to specialise in the design and development of wave energy technology, using his experience in numerical modelling and optimisation to improve the performance of Mocean’s wave energy converters. Recent research strands include time-domain modelling and optimisation development, reinforcement learning for control, and array modelling.

**Title:** *Research and development of wave energy technology at Mocean Energy*



**Name:** Deborah Greaves, FREng, OBE – University of Plymouth

**Bio:** Professor Deborah Greaves is Director of the Interdisciplinary Research Centre for Decarbonisation and ORE, Director of the COAST Laboratory and was Head of the School of Engineering, Computing and Mathematics (2017-2022) at the University of Plymouth with previous appointments at the University of Oxford, UCL and the University of Bath. Her research interests include marine and offshore renewable energy, and physical and numerical modelling of wave-structure interaction. She is Director of the Supergen ORE Hub, has led many national and international research projects in ORE in collaboration with industrial and academic partners and has secured over £27 million research income. In the Queen’s Birthday Honours List, 2018, she was awarded an OBE for services to Marine Renewable Energy, Equalities, and Higher Education and in 2020, she was elected to be a Fellow of the Royal Academy of Engineering. She was appointed as a Member of EPSRC Council in 2022.

**Title:** *Offshore Renewable Energy Research: Supergen ORE Hub*

## Keynote speakers for the CCP-WSI Focus Group Workshop 4



**Name:** Alex Argyros – BP Offshore Wind

**Bio:** Alex is floating systems lead within the BP Offshore Wind organisation and is responsible for floating wind substructure technology. Prior to joining bp in 2021 he spent 10 years at DNV as lead naval architect and technical authority for moorings, working across O&G, floating wind, wave, tidal and solar energy sectors, where he specialised in hydrodynamics, mooring design, integrity management, and marine operations. Before that he obtained his PhD from Cambridge University on ultra-deepwater mooring dynamics and still maintains an active interest in research & development.

**Title:** *Floating wind turbines – opportunities, challenges and numerical analysis*



**Name:** Francesc Fàbregas Flavià – DNV GL

**Bio:** Francesc Fàbregas Flavià is a control and loads engineer at DNV GL Bristol. Before joining DNV GL, Francesc worked as a Lecturer in the Fluid Mechanics section in the department of Civil and Environmental Engineering of Imperial College London. His research focuses on advanced hydrodynamics and on the dynamics of floating structures. Francesc holds an MEng degree in Mechanical Engineering from Universitat Politècnica de Catalunya (UPC, ETSEIB) and an MSc in Renewable Energy Engineering from Cranfield University. After completing his MSc, he worked as a research engineer in the Ocean Systems Test Laboratory of Cranfield University where he participated in the design and testing of small-scale wind and wave energy converter prototypes. He then moved to the LHEEA laboratory of Ecole Centrale de Nantes where he undertook his PhD on the hydrodynamic interactions in large clusters of wave energy converters.

**Title:** *Numerical Modelling for floating Offshore Wind Turbines*



**Name:** Matt Lewis - Intertek Water & Energy

**Bio:** Dr. Matt Lewis is a senior consultant with Intertek, water and energy team. Matt uses hydrodynamic models to map the marine renewable resource, and improve water quality of our rivers and coasts. He has over a decade of academic experience, including previously having held a EPSRC fellowship in marine renewable energy, and has published over 50 peer-reviewed scientific papers with a H-index of 30.

**Title:** *Better ocean characterisation needed for marine renewables and offshore aquaculture: coupled wave-current mean flows*



**Name:** Jonathan Hodges - Wave Energy Scotland

**Bio:** Following an early career in the aerospace industry, developing and testing Rolls-Royce turbofan engines, Jonathan moved to ocean energy sector where he gathered innovation, resource assessment and techno-economic analysis experience. In his role as Innovation and Strategy Manager at Wave Energy Scotland (WES), he aims to identify innovation opportunities, influence research agendas and develop funding strategy to help the sector deliver cost competitive wave energy technologies. Jonathan is involved in global collaboration activities to develop technology assessment tools and processes, deliver consensus on performance metrics, and seek technology transfer opportunities to advance the sector towards commercialisation.

**Title:** *WES driving innovation and cross-sector collaboration*

## Supporting organisations & Exhibitors

The PRIMaRE conference could not take place without the support of sponsoring organisations and exhibitors. We are very grateful to all our sponsors listed below to offer their generous supports for this conference.

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### ***Exhibitor, Presentation & Poster prize sponsor: Supergen Offshore Renewable Energy Hub***

The Supergen Offshore Renewable Energy (ORE) Hub is a £9 Million Engineering and Physical Sciences Research Council (EPSRC) funded consortium of 10 UK leading universities. The Hub is tackling the fundamental engineering research challenges in ORE in order to provide research leadership to connect academia, industry, policymakers and the public, inspire innovation and maximise societal value.

The University of Plymouth leads the Supergen ORE Hub, with Co-Directors from the Universities of Aberdeen, Edinburgh, Exeter, Hull, Manchester, Oxford, Southampton, Strathclyde, and Warwick. The Supergen ORE Hub is one of several Hubs created by EPSRC to deliver sustained and coordinated research on Sustainable Power GENERation and supply. Find out more about the Supergen ORE Hub at [www.supergen-ore.net](http://www.supergen-ore.net)

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### ***Exhibitor: META (Marine Energy Test Area)***

Marine Energy Test Area (META) is a fully consented, pre-commercial testing centre; a flagship Welsh project dedicated to reducing the time, cost and risks associated with deployment and commercialisation. META sits within the Marine Energy Wales portfolio, as Wales' National Test Centre facility. Funded through the Swansea Bay City Deal and a keystone partner of the

Pembroke Dock Marine Project, META offers testing in real sea conditions for wave, tidal and FLOW technology in the Milford Haven Waterway and adjoining seas, alongside a world class port, engineering and manufacturing facilities.

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***Exhibitor: SUT (The Society for Underwater Technology)***

The Society for Underwater Technology (SUT) is a multidisciplinary learned society that brings together organisations and individuals with a common interest in underwater technology, ocean science and offshore engineering.

SUT was founded in 1966 and has members from more than 40 countries, including engineers, scientists, other professionals and students working in these areas. In recent decades many of our members have come from the offshore hydrocarbon sector, today we also see growing numbers of members from offshore renewables, marine autonomous systems, and the policy, law and insurance sectors who support offshore activities of many kinds.

The Underwater Association which also commenced operations in 1966 had a long-standing relationship with SUT, and merged with us in 1992, having played a key role in establishing safer diving practices in consultation with the UK Health & Safety Executive. Their legacy can be particularly seen in the work of our Diving & Manned Submersibles Committee.

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***CCP-WSI Focus Group Workshop***

The Collaborative Computational Project in Wave Structure Interaction (CCP-WSI), funded by EPSRC, brings together two computational communities – fluid dynamics and structural mechanics. Established in 2015, CCP-WSI provides leadership for the WSI community in:

- Strategy setting, identifying priorities for WSI code development
- Contributions to knowledge, through internationally recognised Benchmarking Code Comparisons
- Collaborative software development and support.

More details on CCP-WSI can be found at <https://ccp-wsi.ac.uk/>

## Contacts

If you need any help during the event, please contact

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Dr. Haoyu Ding, [hd484@bath.ac.uk](mailto:hd484@bath.ac.uk)

Please use QR code below for full event information pack, including PRIMaRE Conference and CCP-WSI Focus Group Workshop programme and abstracts.

