Ocean Wave Energy Conversion Technology and Modelling Techniques

Overview

The challenge of climate change and its relationship to the burning of fossil fuels has brought the requirement for the generation and energy from renewable sources to the forefront of scientific and governmental interest. Wave energy is abundant and has the potential to make a significant contribution to the world's energy requirements. However, wave energy is a relatively under-developed source of renewable energy where further technological development is required to make the technology viable. Successful management of this development requires a comprehensive understanding of the wave energy resource, the underlying hydrodynamic principles, the technological challenges and the economic environment within which this development needs to take place. The course will provide a comprehensive wave energy conversion techniques and modelling that will provide an up-to-date understanding of the wave energy industry and enable a critical assessment of future potential. Moreover, it will help to develop a holistic perspective this is an essential requirement prior to more detailed and advanced studies into specific aspects of wave energy. To achieve this the fundamental characteristics of waves and wave energy converter technologies are presented and then related to specific technological challenges and solutions. In addition, a range of tools used for the development of wave energy, including techno-economic tools, are presented together with their strengths and limitations. The participants will gain the skills and knowledge to assess different wave energy conversion techniques, the challenges of maintenance and safety implications of each design. Further, the participants will be able to identify and quantify appropriate sites, assess the available resource and select the correct technology for the location. The course will promote an understanding of the principles, fundamental concepts, design principles and the novel design benefits to the wave energy conversion techniques and modelling.

Course Duration	**27th November 2023 to 1st December 2023**
Mode of Course	**Offline**
Modules	The course will cover following topics: • Fundamentals of wave energy converters • Modelling and representation of the wave climate • Hydrodynamics of wave energy converters • Frequency-domain modelling of wave energy converters • Modelling motion constraints, Potential flow solvers • Wave energy converter power-take off systems • Mooring design for wave energy converters • Representation of wave climate and power performance • Time-domain modelling of wave energy converters • Design of wave farms and semi-analytical array models • Spectral-domain, CFD and non-linear potential flow modelling • Techno-economic modelling of wave energy converters
Host Institute	**National Institute of Technology Karnataka, Surathkal**
No. of Credits	**1**
Maximum No. of Participants	**50**
You Should Attend If…	• You are an Executive/Engineer/Researcher from private and government organizations including R&D laboratories. • You are a student at (BTech/MTech/PhD) of Ocean Engineering and Naval Architecture, Mechanical Engineering, Civil Engineering and Marine Structures. • You are faculty members from reputed academic and technical institutions.

Course Registration Fees	The participation fees for attending the course is as follows: **Participants from abroad:** US$ 200 + 18% GST **Industry/Research Organizations:** Rs. 5000/- + 18% GST **Academic Institutions (Faculty members):** Rs. 3000/- + 18% GST **Academic Institutions (Research scholars):** Rs. 1000/- + 18% GST The above fees include all instructional materials and tutorials.
Accommodation	The participants will be provided with single bed accommodation on payment basis.

Course Faculty

Dr. Matt Folley has worked in wave energy for 30 years. He obtained his PhD on the "Design of point-absorbing wave energy converters" for Lancaster University, UK in 1991, before moving to Queen's University Belfast in 2000. Dr Folley has worked on a large variety of wave energy converters including the 500 kW LIMPET, installed on Islay, Scotland and the 800 kW Oyster, installed at the European Marine Energy Centre, together with numerous other concepts. He is the author of over 50 peer-reviewed papers and editor of the recently-released book "Numerical Modelling of Wave Energy Converters". He is currently chair of the International Committee for the Development of Standards for Wave Resource Assessment and principal UK expert for the Power Performance Assessment of Wave Energy Converters.

Host Faculty

Dr. Debabrata Karmakar is an Assistant Professor at the Department of Water Resources and Ocean Engineering, National Institute of Technology Karnataka, Surathkal. His research interest includes Coastal Hydrodynamics, Offshore wave and wind energy, hydroelasticity of floating structures and wave-structure interaction problems. He has worked as a researcher at Centre for Marine Technology and Ocean Engineering (CENTEC), Instituto Superior Técnico, Lisbon, Portugal and Assistant Professor in the School of Naval Architecture and Ocean Engineering, Indian Maritime University, Visakhapatnam, India. He is presently working as Technical Committee Member of the ISSC Committee V.6 on Ocean Space Utilization of the International Ship and Offshore Structures Congress (ISSC). He has published peer reviewed papers in various International Journal, conference proceedings and book chapters.

Course Coordinator

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