

Floating Offshore Wind Foundations including Mooring Design

17th -18th June 2024

ONLINE



ABOUT THE COURSE

Floating offshore wind (FOW) is a fast-developing industry. This course will explore the basic considerations made when designing a floating offshore wind farm and the principle designs that have been developed so far. The course will cover the main different types of floating offshore wind foundations such as semi-submersible, spar buoy, tension leg and floating barge platforms and highlight the pros and cons of each design. Different types of mooring designs will be introduced.

WHO SHOULD ATTEND

Engineers and researchers involved in the design of offshore floating wind turbines, contracts engineers, wind turbine Installation companies, team leaders, conversion engineers, project engineers and managers, offshore controls engineers and safety inspectors will benefit from attending this course. The course is innovative in both content & structure with a careful balance of theory & practice.

COST

The registration fee of the workshop will be £750 +VAT (UK VAT ONLY) which includes course notes.

COURSE MATERIAL

The lecture notes will be sent in advance.

PAYMENT

Payments can be made by cheque (made payable to ASRANet Ltd.), cash or bank transfer. Please enquire for details.

CONTACT

ASRANet

Limited

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PROGRAMME

Programme

(timings in BST

(GMT +1))

Day 1: Monday 17th June 2024

9:00 - 10:30 Lecture 1: Overview of main different types of offshore floating wind foundations

- Classification of wind turbine and wind energy characteristics
- Components of wind turbine and wind power parameters
- Wind turbine control and blade element momentum theory
- Classification of offshore wind turbines

Dr Debabrata Karmakar

10:30-11:00 Break

11:00 - 12:30 Lecture 2: Marine and offshore environments in offshore wind farms

- Overview of marine and offshore environments (including return period)
- Method for describing wind
- Method for describing tidal current
- Calculation of the wind and tidal current resultant loads applied to floating wind turbines

Dr Wenxian Yang

12:30-13:30 Break

13:30 - 15:00 Lecture 3: Ocean wave analysis applied to floating wind turbines

- Method for describing ocean waves
- Wave statistics • Wave models
- Motions of floating wind turbines in waves

Dr Wenxian Yang

15:00-15:30 Break

15:30 - 17:00 Lecture 4: Wave and current loadings for floating wind turbines

- Introduction of linear wave theory
- Introduction of velocity potential functions • Introduction of diffraction theory

Dr Wenxian Yang

Time (timings in BST (GMT +1))

Day 2: Tuesday 18th June 2024

9:00 - 10:30 Lecture 5: Hydrodynamic design aspects of floating wind turbine platforms

- Requirements for hydrodynamic design of floating wind turbine platforms
- Optimal design for meeting the requirements
- Discussion of the existing designs

Dr Wenxian Yang

10:30-11:00 Break

11:00 - 12:30 Lecture 6: Catenary mooring system analysis for floating wind turbines

- Introduction of catenary mooring systems
- Design of catenary mooring systems
- Safety assessment of catenary mooring systems

Dr Wenxian Yang

12:30- 13:30 Break

13:30 - 15:00 Lecture 7: Hydrodynamic analysis of moored floating platform using ANSYS

- Design of floating platform and generation of the geometric data file
- Design of mooring systems
- Basic operation of ANSYS-AQWA

Dr Debabrata Karmakar

15:00-15:30 Break

15:30 - 17:00 Lecture 8: Evaluation of hydrodynamic parameters using ANSYS

- Simulation of hydrodynamic parameters using ANSYS-AQWA
- Case study using ANSYS-AQWA
- Numerical analysis of hydrodynamic parameters

Dr Debabrata Karmakar

Lecturer CV

Dr Wenxian Yang, Senior Lecturer, Newcastle University

Dr Wenxian Yang obtained his PhD degree from Xi'an Jiaotong University in 1999. He is currently a Senior Lecturer in offshore renewable energy at Newcastle University. Dr Yang is a chartered engineer, the Fellow of the UK Higher Education Academy, the member of the Royal Institution of Naval Architects, the Institution of Engineering and Technology, and the American Society of Mechanical Engineers. With expertise in marine and offshore renewable energy, he has consistently strived to lower the Cost of Energy of offshore renewable power by developing various approaches using the knowledge in multiple disciplines, e.g. increasing availability and reducing operation and maintenance cost of offshore wind turbines by developing advanced condition monitoring techniques; assuring the safety of the fixed foundation of offshore wind turbines by designing and developing countermeasure devices against scour caused by tidal current; improving the power generation efficiency of wind and tidal turbine by developing biomimetic airfoil/hydrofoil technologies; increasing the economic return of offshore floating wind turbines by developing motion-stable floating platform technologies. Recently, in order to meet the urgent requirement by the rapidly growing offshore wind market, Dr Yang's research interest is also extended to addressing the challenging issues existing in the design and application of offshore wind farm support vessels. For example, in view of the unsatisfactory seakeeping performance of offshore wind farm crew transfer vessel, he has developed a new cost-effective technique dedicatedly for stabilizing wind farm crew transfer vessels; to enable quickly access to those offshore wind turbines located at far offshore distance whilst costing less fuel and achieving better seakeeping performance, he developed a number of innovative ship design techniques and successfully supervised 6 postgraduate research theses to address the issue. In 2017, his research on the ageing issues of wind turbine components and assemblies was identified by Renewable Energy Global Innovation as a key contribution to the excellence in renewable and clean energy research. Besides these, Dr Wenxian Yang endeavours to develop research in the cutting-edge area of renewable energy also through collaborating with the scientists and experts working in different fields. For example, he worked together with the material and chemical engineering scientists of the universities of Newcastle, Durham and Northumbria and successfully established the 'Northeast Centre for Energy Materials' funded by EPSRC in 2017. So far, Dr Yang has published over 100 papers in top journals. According to the latest survey of Google Scholar, his papers have been cited 1652 times since 2014. Dr Yang's successful research has also attracted great interest from industrial partners. For example, Dr Yang was funded by Innovate UK to lead a 3-year Knowledge Transfer project (2014-2017) in order to help Offshore Renewable Energy CATAPULT Centre (ORE-CATAPULT) to improve the safe operation of their offshore wind turbines.

Dr Debabrata Karmakar, Assistant Professor, NITK Surathkal

Dr Debabrata Karmakar obtained his PhD degree from Department of ocean Engineering and Naval Architecture, Indian Institute of Technology Kharagpur, India in 2009. He worked as post-doctoral researcher at Centre for Marine Technology and Ocean Engineering (CENTEC), IST Lisbon, Portugal from 2010 - 2015 on the problems related to (a) dynamic analysis of offshore floating wind turbines, (b) wind turbine extreme loads using inverse reliability methods and (c) hydrodynamic analysis of surging plate wave energy converters. Dr Karmakar is presently working as Assistant Professor in Department of Water Resources and Ocean Engineering, National Institute of Technology Karnataka, Surathkal, India. In NITK Surathkal, he has undertaken research studies on “Offshore Renewable Energy and Simulation”. In addition, he has established foreign collaborations with CENTEC, IST Lisbon, Portugal, University of Michigan, USA, Nihon University, Japan and Yokohama University, Japan, in the area of Offshore Renewable Energy. Further, he has undertaken research projects on “Dynamic analysis of offshore floating wind turbine” sponsored by SERB, DST “Performance of multi-purpose offshore energy platform” sponsored by DST under India-Portugal Bilateral Technological Cooperation, “Design, analysis and development of combined wave and wind energy multi-use platform” sponsored by SERB, DST, “Desalination of sea-water using wave and wind power” sponsored by VGST, Government of Karnataka, “Design, analysis of the development of hybrid offshore floating breakwater” sponsored by Ministry of Ports, Shipping and Waterways, New Delhi. Along with the research studies, collaboration with various industries and academic institutions is also being carried out. The research group in “Offshore Renewable Energy and Simulation” in the Department of Water Resources and Ocean Engineering (Formerly, Applied Mechanics and Hydraulics), NITK Surathkal, has performed successful validation of offshore floating platform concepts such as WindFloat and TLP-type offshore wind turbine support structures. The research group has submitted patents on the “combined wave and wind energy device” and “wave energy converter integrated with breakwater”. In addition, to the research activities, he is also working as a technical committee member in International Ship and Offshore Structure Congress (ISSC) for the committee “V4. Offshore Renewable Energy” and “V6. Ocean Space Utilization” during 2012-2015, 2015-2018 and 2018-2022 and 2022-2025.