ON-LINE Course on
Design & Analysis of Floating Wind Turbine Structures

13th and 14th May 2021

ABOUT THE COURSE

Offshore wind development has witnessed a steady growth in the last decade. Floating wind turbines are a promising new technology in the field of offshore wind power development, particularly in deep water. In recent years, significant R&D effort has been spent in conceiving floater designs that are stiff enough to accommodate wind turbines and stable enough to cope with the highly dynamic environments that prevail in deep seas. Concomitantly, great amount of time has also been invested in developing design tools to accurately model and predict the dynamics of coupling wind turbines to floating structures. The course will deal with various aspects for the design and analysis of floating wind turbines including foundation.

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, 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 £595 + VAT (UK only) which includes course notes

PAYMENT

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

CONTACT

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PROGRAMME

Thursday 13th May 2021

09.00 - 10.30 Lecture 1: Overview of Floating Wind Turbine Concepts and Recent Developments
Mr Ben Smith

10.30 – 11.00 *Break*

11.00 - 12.30 Lecture 2: Analysis Methods for Floating Wind Turbines
Mr Ben Smith

12.30 - 13.30 *Lunch*

13.30 – 15.00 Lecture 3: Design Requirements for Floating Wind Turbines
Mr Ben Smith

15.00 - 15.30 *Break*

15.30 - 17.00 Lecture 4: Marine and offshore environments in offshore wind farms
Dr Wenxian Yang

Friday 14th May 2021

09.00 - 10.30 Lecture 5: Ocean Wave Analysis Applied to Floating Wind Turbines
Dr Wenxian Yang

10.30 - 11.00 *Break*

11.00 - 12.30 Lecture 6: Wave and Current Loadings for Floating Wind Turbines
Dr Wenxian Yang

12.30 - 13.30 *Lunch*

13.30 - 15.00 Lecture 7: Hydrodynamic Design Aspects of Floating Wind Turbine Platforms
Dr Wenxian Yang

15.00 - 15.30 *Break*

15.30 - 17.00 Lecture 8: Catenary Mooring System Analysis for Floating Wind Turbines
Dr Wenxian Yang

LECTURE CONTENT

Lecture 1: Overview of Floating Wind Turbine Concepts and Recent Developments
- Brief Overview of Floating Wind Industry
- Benefits of Floating Wind
- Key Technology Types & Differences
- Key FOW Markets & Current Projects

Lecture 2: Analysis Methods for Floating Wind Turbines
- Key Design Requirements for FOWTs
- A Typical FOWT Overview
- Hull & Mooring Design Process
- Project Walkthrough

Lecture 3: Design Requirements for Floating Wind Turbines
- Overview of Coupled, Mooring analysis & Load analysis
- Use of CFD in FOWT design applications
- Model Testing of FOWTs
- Current and Future R&D Focus Areas

Lecture 4: 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

Lecture 5: Ocean Wave Analysis Applied to Floating Wind Turbines
- Method for describing ocean waves
- Wave statistics
- Wave models
- Motions of floating wind turbines in waves

Lecture 6: Wave and Current Loadings for Floating Wind Turbines
- Introduction of linear wave theory
- Introduction of velocity potential functions
- Introduction of diffraction theory

Lectures 7: 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

Lecture 8: Catenary Mooring System Analysis for Floating Wind Turbines
- Introduction of catenary mooring systems
- Design of catenary mooring systems
- Safety assessment of catenary mooring systems

LECTURER CV'S

Ben Smith, Senior Naval Architect, Engineering & Consulting

Ben Smith is a Senior Naval Architect with 8 years' experience in the design of fixed and floating offshore structures and holds a MEng in Ship Science / Naval Architecture from Southampton University. He has been involved in design projects at all stages from concept through FEED / detailed design and into construction; initially in the Oil and Gas industry but most recently in the Offshore Renewables industry. Ben has been involved in a range of floating wind projects which have included two pioneering UK projects; Dounreay Tri and most recently the Kincardine Wind Farm for which he acted as Lead Naval Architect."

Dr Wenxian Yang, Senior Lecturer in Offshore Renewable Energy

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 costeffective 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 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.