OS05 – Wind and Ocean Energy Technologies

Organizers: Manabu Takao, Yoichi Kinoue, Yutaka Hara, Abdus Samad, Min Yoon, Bruno Pereiras Garcia

Covering more than 70 percent of the Earth's surface, the world's oceans constitute an immense and largely untapped reservoir of renewable energy. A wide range of ocean-energy conversion systems rely fundamentally on turbines and other forms of rotating machinery. For instance, oscillating water column (OWC) based wave energy systems commonly employ Wells or impulse turbines; tidal and marine current power systems utilize axial-flow or cross-flow turbines; and ocean thermal energy conversion (OTEC) systems integrate both turbines and pumps within a more complex thermodynamic cycle.

In parallel, wind power generation systems harness the kinetic energy of the atmosphere and convert it into rotational power through horizontal- or vertical-axis wind turbines, forming one of the most mature and rapidly advancing renewable-energy technologies.

This session invites contributions spanning conceptual innovations, experimental investigations, numerical and computational studies, installation practices, and comprehensive reviews related to wind and ocean energy technologies. Authors are encouraged to submit high-quality research that will advance understanding, foster technological development, and promote knowledge dissemination within the broader rotating-machinery and renewable-energy communities.

Non-exhaustive list of suggested topics

- Advanced turbine concepts for wind and ocean applications
- CFD simulations of turbine aerodynamics and hydrodynamics
- Experimental studies on wave and tidal energy systems
- Structural analysis and fatigue of rotating machinery
- Control strategies for wind and marine energy converters
- Performance optimization of axial and cross-flow turbines
- Modeling of OWC chambers and turbine interactions
- Environmental impacts of offshore wind and ocean devices
- Hybrid renewable systems combining wind and ocean resources
- Innovative materials and designs for energy turbines

Organizers

Manabu Takao has been working as a professor at National Institute of Technology (NIT), Matsue College, Japan. He got his M.S. degree and Dr.Eng. from Saga University, Japan. His research interests include fluid machinery and renewable energy utilization and he is particularly engaged in the research and development of air turbines used for oscillating water column based wave energy converter.

Yoichi Kinoue has been working as a professor in the Department of Mechanical Engineering, Faculty of Science and Engineering, Saga University. He got his M.S. degree and Dr.Eng. from Kyushu University. His research interests include fluid machinery and flow engineering and he is particularly engaged in the research and development of bidirectional duct and turbine system used for tidal current energy conversion.

Yutaka Hara has been working as a professor in the Department of Mechanical Physics, Faculty of Engineering, Tottori University. He got his M.S. degree and Dr.Eng. from Nagoya University. His research field is wind turbine engineering, with a particular focus on vertical-axis wind turbines (VAWTs). His recent research interests include aeroelastic analysis of VAWTs and optimal VAWT placement in wind farms.

Abdus Samad is a Professor and Head of the Department of Ocean Engineering at the Indian Institute of Technology Madras (IIT Madras), India. His research expertise spans marine and ocean energy systems, fluid mechanics, fluid machinery, design optimization, and artificial intelligence applications in ocean engineering. He is a Fellow of ASME, IMechE (UK), and IEI (India). He has authored and co-authored over 178 Scopus-indexed publications, edited and authored multiple books published by Springer, and authored a textbook on Fluid Machinery (Wiley, 2019). He holds six patents in the areas of fluid machinery and energy systems. He has played a key role in organizing international conferences, workshops, and academic programs, and actively contributes to research, education, and policy discussions related to the blue economy and sustainable ocean technologies.

Min Yoon received his Ph.D. in Mechanical Engineering from KAIST, Republic of Korea, in 2019. He is currently an Associate Professor in the Department of Mechanical Engineering at Korea Maritime & Ocean University, Busan, Republic of Korea. His research interests include turbulence, computational fluid dynamics (CFD), renewable energy, and flow control, with a particular focus on the research and development of air turbines used in oscillating water column wave energy conversion systems.

Bruno Pereiras Garcia obtained his PhD from the University of Valladolid in 2008, where he subsequently worked as a lecturer until 2010. He later joined Arcelor-Mittal as a Research Engineer. Since 2012, he has been affiliated with the Energy Department at the University of Oviedo (Spain), where he teaches Fluid Mechanics. His research activity has encompassed several fields, including aeroacoustics in turbomachinery, wave-energy turbines, air-knife nozzle design, vertical-axis wind turbines (VAWTs) and aerodynamics, among others.

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