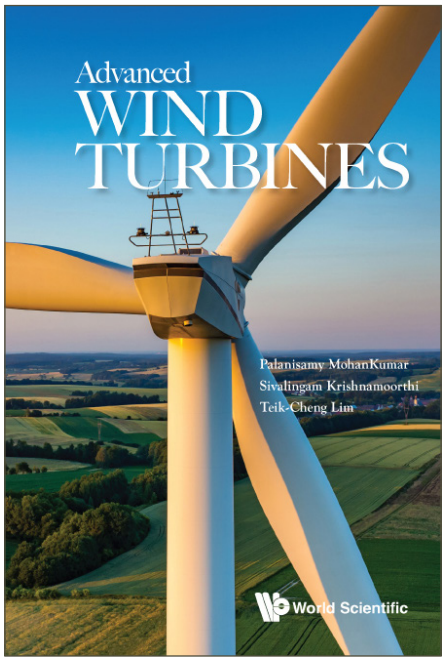
Advanced Wind Turbines



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REVIEW

"This book provides a comprehensive and up-to-date overview of the latest advances in wind turbine technology, and offers insights into the key challenges and opportunities facing the industry. Written by leading experts in the field, it covers topics such as the fundamentals of Vertical Axis Wind Turbines and design optimization for low wind speed, the latest advances in turbine blade and tower design (including innovations in materials, aerodynamics, and manufacturing), the role of Floating Offshore Wind Turbines (FOWT) and its advancements, and the techno-economics of large-scale offshore wind turbines/farms. The book is intended for students, researchers, and professionals in the fields of wind energy, renewable energy, and sustainable development."

— *Sundararajan Natarajan*
Assistant Professor, Indian Institute of Technology-Madras, India

ABOUT THE BOOK

How can non-windy places make use of wind power for electricity generation? *Advanced Wind Turbines* provides detailed information that is of great practical importance to wind turbine practitioners from small and congested city-states, where the lack of vast land and high wind speed render the conventional wind turbine less effective. It introduces the non-conventional Darrieus and Savonius wind turbines, as well as their hybrid version, covering basic concepts, computational modelling and recent advances in experimental optimization.

What about those who prefer wind turbines in faraway oceans to take advantage of high wind speed, or who come from countries with a lack of shallow seabed? Floating offshore wind turbines are also discussed, and the dynamics of floating vis-à-vis grounded wind turbines are thoroughly expounded upon to aid practitioners in achieving more accurate performance modelling. This is a work of paramount usefulness for areas which have long wanted to jump on the renewable energy bandwagon, but have thus far been hampered by their natural geographical limitations.

READERSHIP

Wind turbine engineers and companies working on non-conventional wind turbines, such as Vertical Axis Wind Turbines and Floating Offshore Wind Turbines. Academics, researchers, and postgraduate students in Wind Engineering.

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ABOUT THE AUTHORS

Dr Palanisamy MohanKumar is an expert in renewable energy technologies, thermal management of electrical systems, and precision machine design. Currently, he is the technical manager for the Mechanical and Thermal division of Rolls Royce Electrical (RRE) at Rolls Royce Singapore Pte Ltd. He is specialized in wind energy, tidal energy, resource assessments, and various energy storage technologies with over 18 years of experience in design and deployment of these systems. He has developed multiple wind and tidal turbines, especially for low wind and tidal resources that have been deployed in and around Singapore. He specialized in wind turbine aerodynamics and related computational fluid dynamics which earned him an industrial PhD for the development of vertical axis wind turbines. Previous roles include Research and Development engineer specializing in the design of CNC machines, leading to a Masters in product design at Nanyang Technological University, Singapore. As a research engineer at the Energy Research Institute, Singapore, he developed battery energy storage systems, compressed air energy storage, and thermal energy storage for microgrid applications. As a research fellow at the National University of Singapore, he devised thermal management systems for medical devices. In RRE, currently, he is heading an international team to develop battery systems for aircraft and utility-scale energy storage and thermal management of power converter systems.

Dr Krishnamoorthi Sivalingam is an expert in energy transition (including wind energy). Currently he is Senior Manager at Surbana Jurong Pte Ltd, Singapore, managing the Energy Transition portfolio of the company's Energy and Industrial division to enable industries and various infrastructure-related projects to create a sustainable pathway to achieve net-zero carbon emission targets via renewable energy, energy efficiency with combined cycle gas turbines, and electrification. He was previously a Technical Manager at Rolls Royce Singapore Pte Ltd, Engineering Manager at NTUtive of Nanyang Technological University, Singapore, and also worked in Lloyds Register, Siemens, Vestas, UTAC, Delphi Automotive Systems, and the Indian

Government R&D Center. He was deeply involved in several prominent multi-million-dollar projects and possesses vast experience in project, people, proposal and technical management in his 23 years of industrial experience. He is an expert in renewable energy systems including wind energy, energy storage systems, hydrogen fuel cells, electrification, and electro-thermo-mechanical aspects of other energy engineering systems. He has authored/co-authored nearly 30 papers in conferences and journals. He has also contributed to 21 patents and made more than 150 invention disclosures. He has conducted numerous market analyses, concept and feasibility studies, and managed various stakeholders, standards committees and regulatory authorities. He had directly contributed to and managed several significant projects, such as aerospace-related products development, wind (onshore and offshore including floating offshore wind), thermo-mechanical systems design, development, battery energy storage systems, CoolerTop thermal systems for megawatt scale wind turbines and water treatment systems. Moreover, he has vast experience in dealing with fluid flow machinery and thermal systems at various levels including computational methodologies, analytical solutions, and final design of the product or project. He is proficient in the application of artificial intelligence, machine learning, Internet of Things, data science, digital twin, and predictive analytics to engineering systems. He is also a digital transformation leader in engineering applications.

Associate Professor Teik-Cheng Lim is Head of PhD (Engineering) and Master of Engineering Programmes at the Singapore University of Social Sciences, Singapore. He won a Faculty of Engineering Annual Book Prize for his undergraduate studies at the National University of Singapore (NUS) and was subsequently awarded a research scholarship to pursue his PhD at NUS. He has written and edited 6 books, namely *A Partially Auxetic Metamaterial Inspired by the Maltese Cross* (Cambridge University Press, 2022), *Mechanics of Metamaterials with Negative Parameters* (Springer, 2020), *Auxetic Materials and Structures* (Springer, 2015), *Advances in Therapeutic Engineering* (Taylor and Francis, 2012), *Nanosensors* (Taylor and Francis, 2011), and *An Introduction to Electrospinning and Nanofibers* (World Scientific, 2005). He has served as competition judge for the Singapore Science & Engineering Fair (SSEF) organized by the Singapore Science Centre, and Energy Innovation Challenge organized by the Institution of Engineers, Singapore. He also served as external examiner for PhD theses at the University of Malta, Hong Kong Polytechnic University and Indian Institute of Technology, and has been teaching part-time for Harbin Institute of Technology, China.

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