Model Predictive Control of Wind Energy Conversion Systems
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DESCRIPTION

*Model Predictive Control of Wind Energy Conversion Systems* addresses the predictive control strategy that has emerged as a promising digital control tool within the field of power electronics, variable-speed motor drives, and energy conversion systems.

The authors provide a comprehensive analysis on the model predictive control of power converters employed in a wide variety of variable-speed wind energy conversion systems (WECS). The contents of this book include an overview of wind energy system configurations, power converters for variable-speed WECS, digital control techniques, MPC, modeling of power converters and wind generators for MPC design. Other topics include the mapping of continuous-time models to discrete-time models by various exact, approximate, and quasi-exact discretization methods, modeling and control of wind turbine grid-side two-level and multilevel voltage source converters. The authors also focus on the MPC of several power converter configurations for full variable-speed permanent magnet synchronous generator based WECS, squirrel-cage induction generator based WECS, and semi-variable-speed doubly fed induction generator based WECS. Furthermore, this book:

- Analyzes a wide variety of practical WECS, illustrating important concepts with case studies, simulations, and experimental results
- Provides a step-by-step design procedure for the development of predictive control schemes for various WECS configurations
- Describes continuous- and discrete-time modeling of wind generators and power converters, weighting factor selection, discretization methods, and extrapolation techniques
• Presents useful material for other power electronic applications such as variable-speed motor drives, power quality conditioners, electric vehicles, photovoltaic energy systems, distributed generation, and high-voltage direct current transmission.

• Explores S-Function Builder programming in MATLAB environment to implement various MPC strategies through the companion website

Reflecting the latest technologies in the field, *Model Predictive Control of Wind Energy Conversion Systems* is a valuable reference for academic researchers, practicing engineers, and other professionals. It can also be used as a textbook for graduate-level and advanced undergraduate courses.

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**ABOUT THE AUTHOR**

Venkata Yaramasu is currently working as an Assistant Professor of Electrical Engineering in the School of Informatics, Computing, and Cyber Systems, Northern Arizona University, USA. He has published more than 50 peer-reviewed technical papers including 22 journal papers, and 10 technical reports for the industry. Dr. Yaramasu worked closely with Rockwell Automation, Toronto Hydro, Hydro One, Natural Sciences and Engineering Research Council of Canada, Wind Energy Strategic Network and Connect Canada, and completed 8 industrial projects in Power Electronics, Electric Drives and Renewable Energy. Dr. Yaramasu is recipient of over 15 awards for research and teaching excellence.

Bin Wu is currently a Professor in the Department of Electrical and Computer Engineering, Ryerson University, Canada and is the Senior NSERC/Rockwell Automation Industrial Research Chair in Power Electronics and Electric Drives. Dr. Wu has published more than 350 peer-reviewed technical papers, two Wiley-IEEE Press books, and holds more than 30 issued and pending patents in power electronics, adjustable-speed drives and renewable energy systems. He is a Fellow of the Institute of Electrical and Electronic Engineers (IEEE), Engineering Institute of Canada (EIC), and Canadian Academy of Engineering (CAE). Dr. Wu is a Registered Professional Engineer in the Province of Ontario, Canada.

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