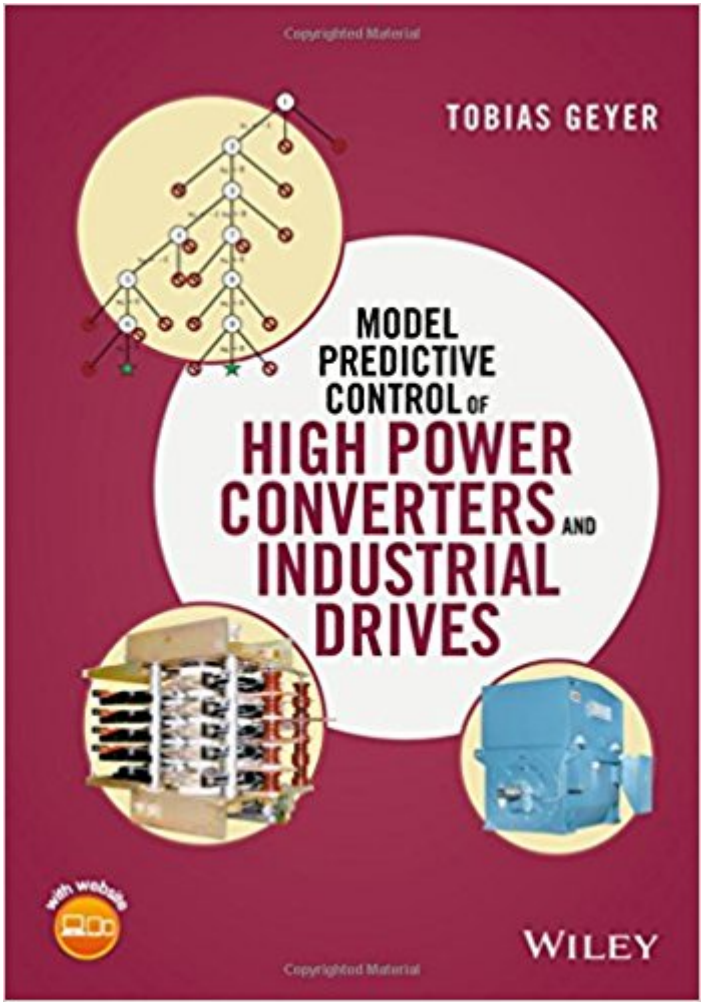
Model Predictive Control Of High Power Converters And Industrial Drives



Synopsis

In this original book on model predictive control (MPC) for power electronics, the focus is put on high-power applications with multilevel converters operating at switching frequencies well below 1 kHz, such as medium-voltage drives and modular multi-level converters. Consisting of two main parts, the first offers a detailed review of three-phase power electronics, electrical machines, carrier-based pulse width modulation, optimized pulse patterns, state-of-the art converter control methods and the principle of MPC. The second part is an in-depth treatment of MPC methods that fully exploit the performance potential of high-power converters. These control methods combine the fast control responses of deadbeat control with the optimal steady-state performance of optimized pulse patterns by resolving the antagonism between the two. MPC is expected to evolve into the control method of choice for power electronic systems operating at low pulse numbers with multiple coupled variables and tight operating constraints it. Model Predictive Control of High Power Converters and Industrial Drives will enable to reader to learn how to increase the power capability of the converter, lower the current distortions, reduce the filter size, achieve very fast transient responses and ensure the reliable operation within safe operating area constraints. Targeted at power electronic practitioners working on control-related aspects as well as control engineers, the material is intuitively accessible, and the mathematical formulations are augmented by illustrations, simple examples and a book companion website featuring animations. Readers benefit from a concise and comprehensive treatment of MPC for industrial power electronics, enabling them to understand, implement and advance the field of high-performance MPC schemes.

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Customer Reviews

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Tobias Geyer, ABB Corporate Research Center, Switzerland Tobias Geyer joined ABB's Corporate Research Center as a deputy group leader and principal scientist in 2012. In this role, he is building up a dedicated research team focusing on Model predictive control (MPC) for power electronic systems. After obtaining his PhD at ETH Zurich, he spent three years in GE's Corporate Research Center in Munich as a project leader for high-power electronics and drives. He subsequently worked at the intersection of academia and industrial research, fully funded by ABB and part of an ABB research team, whilst being employed by the University of Auckland as a Research Fellow. During this time, his focus was on the development of a new generation of drive control schemes that is intended to replace ABB's currently used schemes in their medium-voltage drive portfolio. Tobias Geyer has been working on MPC for power electronics since 2002, and was one of the first

researchers who began working in this field. During the past 12 years he has written approximately 100 peer-reviewed journal and conference publications and patent applications. He is also an Associate Editor of Transactions on Power Electronics and Transactions on Industry Applications.

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