electrical machines, power electronics, and drives. He is always timely with his new contributions. This time, he presents a new handbook devoted to a wide family of linear electric machines (LEMs), which realize the conversion of electrical energy to linear motion mechanical energy, or vice versa, based on electromagnetic forces. The fast development of industrial LEMs has been observed since 1960, thanks to the development of power electronic converters used for linear position, speed, and force control. The book is based mainly on more than 40 years of the author's experiences and recent contributions to the topic worldwide. It consists of the following 22 chapters:

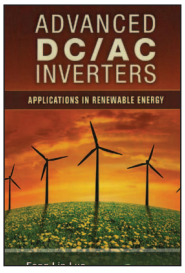
1) "Fields, Forces, and Materials for LEMs"
2) "Classification and Applications of LEMs"
3) "Linear Induction Motors: Topologies, Fields, Forces, and Powers"
4) "Linear Induction Motors: Circuit Theories, Transients, and Control"
5) "Design of Flat and Tabular Low-Speed LIMs"
6) "Transportation (Medium- and High Speed) SLIM Design"
7) "DC-Excited Linear Synchronous Motors (DCE-LSM): Steady State, Design, Transients, and Control"
8) "Superconducting Magnet Linear Synchronous Motors"
9) "Homopolar Linear Synchronous Motors (H-LSM): Modeling, Design, and Control"
10) "Linear Reluctance Synchronous Motors: Modeling, Performance Design, and Control"
11) "Linear Switched Reluctance Motors (L-SRM): Modeling, Design, and Control"
12) "Flat Linear Permanent Magnet Synchronous Motors"
13) "Tubular Linear Permanent Magnet Synchronous Motors"
14) "Multi-Pole Coil Three- or Two-Phase Linear PM Reluctance Motors"
15) "Plunger Solenoids and Their Control"
16) "Linear DC PM Brushless Motors"
17) "Resonant Linear Oscillatory Single-Phase PM Motors/Generators"
18) "Multiaxis Linear PM Motor Drives"
19) "Attraction Force (Electromagnetic) Levitation Systems"
20) "Repulsive Force Levitation Systems"
21) "Active Guideway Maglevs"
22) "Passive Guideway Maglevs."

Each chapter is supplemented with key conclusions (summary) and an adequate selected list of references at the end. The text achieves a balance between mathematical rigor and physical insight. The reader will find interesting design (calculation) examples and simulation study, well illustrating performances of presented LEMs. A potential reader of this book should have a basic knowledge of power electronics and some familiarity with control and signal processing. This very useful book integrating tutorial and monograph attributes can be strongly recommended mainly for research and development engineers in industry and for senior undergraduate and graduate students in electric power, mechanical, robotics, and electrical engineering.

I strongly believe that this new handbook by Prof. Boldea will be as successful as the previous books carrying his signature.

—Marian P. Kazmierkowski

Advanced DC/AC Inverters: Applications in Renewable Energy



By Fang Lin Luo and Hong Ye, CRC Press, 2013, 322 pages, hardback, ISBN-13: 978-1-4665-1135-4.

Direct current (dc) to alternating current (ac) electronic power conversion is of paramount importance for renewable energy systems, flexible ac transmission systems, fuel cells, and electrical vehicles. Required power inverters should supply nearly distortion-free sinusoidal voltages, which need cumbersome passive filtering or high number of dc voltage levels—multilevel inverters [1]. The book *Advanced DC/AC Inverters: Applications in Renewable Energy* presents advanced inversion technologies and provides design examples of inverters for renewable energy systems, including wind turbine and solar panel energy systems. The text systematically reviews cutting-edge inverter topologies and introduces new advanced topologies, originally developed by the authors, such as impedance source inverters (ZSI), quasi ZSI (qZSI), soft-switching inverters, and multilevel inverters up to 81 levels.

Novel topologies include trinary hybrid multilevel inverters and four novel multilevel inverters: new series laddered multilevel converters, super-lift converter multilevel inverters, switched capacitor multilevel inverters, and switched inductor multilevel inverters. The authors also present modulation strategies and four methods to solve the problem of the accurate determination of the best switching angles to obtain lowest total harmonic distortion (THD) in advanced multilevel inverters. The analysis of the dc bus power injection is also presented, and methods to avoid regenerative power are also proposed. The text offers theoretical concepts, diagrams, summarizing tables, simulation and experimental results, and design examples for students, researchers, and engineers willing to learn from experts on how to design and implement inverters for renewable energy systems.

Prof. Dr. Fang Lin Luo, Ph.D. (Cambridge U., U.K.), IEEE Senior Member, full professor at AnHui University, China, and Dr. Hong Ye, Ph.D. (NTU, Singapore), IEEE Member, Research Fellow at Nanyang Technological University (NTU), Singapore, are pioneers in advanced conversion technology, having created a large number of converters, including the well-known dc/dc Luo-converters and super-lift Luo-converters [2], and publishing 13 books and more than 300 papers in advanced power electronics converters for renewable energy systems, motor drives, and electrical vehicles.

Th e text is divided into 15 chapters:

1) "Introduction (Symbols and Factors Used, FFT—Fast Fourier Transform, DC/AC Inverters)"
2) "Pulse Width-Modulated DC/AC Inverters (Parameters Used in PWM Operation, Typical PWM Inverters)"

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3) "Voltage Source Inverters—VSI (Single-Phase Voltage Source Inverter, Three-Phase Full-Bridge VS, Vector Analysis, and Determination of Modulation Index, Multistage PWM Inverter)"
4) "Current Source Inverters—CSI (Three-Phase Full-Bridge Current Source Inverter, Boost-Type CSI, CSI with L-C Filter)"
5) "Impedance Source Inverters—ZSI (Comparison with VSI and CSI, Equivalent Circuit and Operation, Circuit Analysis and Calculations, Simulation and Experimental Results)"
6) "Quasi-Impedance Source Inverters—qZSI (Introduction to ZSI and Basic Topologies, Extended Boost qZSI Topologies)"
7) "Soft-Switching DC/AC Inverters (Notched DC Link Inverters for Brushless DC Motor Drive, Resonant Pole Inverter, Transformer-Based Resonant DC Link Inverter)"
8) "Multilevel DC/AC Inverters (Diode-Clamped Multilevel Inverters, Capacitor-Clamped Multilevel Inverters—Flying Capacitor Inverters, Multilevel Inverters Using H-Bridge—HB Converters, Other Kinds of Multilevel Inverters)"
9) "Trinary Hybrid Multilevel Inverter—THMI (Topology and Operation, Proof of Greatest Number of Output Voltage Levels, Experimental Results, Trinary Hybrid 81-Level Multilevel Inverter)"
10) "Laddered Multilevel DC/AC Inverters Used in Solar Panel Energy Systems (Progressions, Laddered Multilevel DC/AC Inverters, Comparison of All Laddered Inverters, Solar Panel Energy Systems, Simulation and Experimental Results)"
11) "Super-Lift Converter Multilevel DC/AC Inverters Used in Solar Panel Energy Systems (Super-Lift Converter Used in Multilevel DC/AC Inverters, Simulation and Experimental Results)"
12) "Switched-Capacitor Multilevel DC/AC Inverters in Solar Panel Energy Systems (Switched Capacitor Used in Multilevel DC/AC Inverters, Simulation and Experimental Results)"
13) "Switched Inductor Multilevel DC/AC Inverters Used in Solar Panel Energy Systems (Switched Inductor Used in Multilevel DC/AC Inverters, Simulation and Experimental Results)"
14) "Best Switching Angles to Obtain Lowest THD for Multilevel DC/AC Inverters (Methods for Determination of Switching Angle, Best Switching Angles)"
15) "Design Examples for Wind Turbine and Solar Panel Energy Systems (Wind Turbine Energy Systems, Solar Panel Energy Systems)."

A table of contents, preface, references at the end of each chapter, and an index are also included.

Highlighting several pioneering solutions to implement dc/ac conversion for renewable energy systems, the book is valuable for further discussion, research and development, suitable for teachers, students, and researchers in the field of inverters for renewable energy. The book is also valuable for industry professionals willing to know about power inverters cutting-edge technology in renewable energy systems.

—Fernando A. Silva

References

[1] L. G. Franquelo, J. Rodríguez, J. I. Leon, S. Kouro, R. Portillo, and M. A. M. Prats, "The age of multilevel converters arrives," *IEEE Ind. Electron. Mag.*, vol. 2, no. 2, pp. 28–39, June 2008.
[2] *Power Electronics Handbook*, 3rd ed., M. H. Rashid, Ed. London, U.K.: Butterworth, 2011.