

## Electric Drives Boldea

Electric Drives, Second Edition  
 Linear Motion Electromagnetic Devices  
 Electric Machine Dynamics  
 Induction Machines Handbook  
 The Induction Machine Handbook  
 High Performance Control of AC Drives with Matlab/Simulink  
 Sensorless Vector and Direct Torque Control  
 Electric Generators Handbook - Two Volume Set  
 Handbook of Automotive Power Electronics and Motor Drives  
 Electric Machines  
 Linear Synchronous Motors  
 Industrial Power Distribution and Illuminating Systems  
 Electric Machines  
 Control of Electric Machine Drive Systems  
 Electric Vehicle Machines and Drives  
 Modern Electrical Drives  
 Modelling and Control of Switched Reluctance Machines  
 Linear Electric Machines, Drives, and MAGLEVs Handbook  
 SPECIAL ELECTRICAL MACHINES  
 Electric Drives  
 Electric Machines  
 Linear Electric Actuators and Generators  
 Linear Electric Motors  
 Electric Drives  
 Synchronous Generators  
 Solutions Manual for Electric Drives, Second Edition  
 Electric Machines and Drives  
 Brushless Motors  
 Energy Efficiency Improvements in Electric Motors and Drives  
 Linear Motion Electric Machines  
 Power Electronics and Motor Drives  
 High Performance AC Drives  
 Permanent Magnet Reluctance & Self Synchronous Motors  
 Fundamentals of Electrical Drives  
 Switched Reluctance Motor Drives  
 Electric Vehicle Technology Explained  
 Reluctance Synchronous Machines and Drives  
 The Induction Machines Design Handbook, Second Edition  
 Vector Control of AC Drives

*Electric Drives Boldea*

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### VALENTINA WINTERS

*Electric Drives, Second Edition* CRC Press

Electrical drives lie at the heart of most industrial processes and make a major contribution to the comfort and high quality products we all take for granted. They provide the controller power needed at all levels, from megawatts in cement production to milliwatts in wrist watches. Other examples are legion, from the domestic kitchen to public utilities. The modern electrical drive is a complex item, comprising a controller, a static converter and an electrical motor. Some can be programmed by the user. Some can communicate with other drives. Semiconductor switches have improved, intelligent power modules have been introduced, all of which means that control techniques can be used now that were unimaginable a decade ago. Nor has the motor side stood still: high-energy permanent magnets, semiconductor switched reluctance motors, silicon micromotor technology, and soft magnetic materials produced by powder technology are all revolutionising the industry. But the electric drive is an enabling technology, so the revolution is rippling throughout the whole of industry.

*Linear Motion Electromagnetic Devices* Prentice Hall

A timely comprehensive reference consolidates the research and development of electric vehicle machines and drives for electric and hybrid propulsions • Focuses on electric vehicle machines and drives • Covers the major technologies in the area including fundamental concepts and

applications • Emphasis the design criteria, performance analyses and application examples or potentials of various motor drives and machine systems • Accompanying website includes the simulation models and outcomes as supplementary material

*Electric Machine Dynamics* CRC Press

The reduction of energy consumption through improvements in energy efficiency has become an important goal for all countries, in order to improve the efficiency of the economy, to increase energy supply security, and to reduce the emissions of CO and other pollutants caused by power-generation. 2 Electric motors use over half of all electricity consumed in developed countries. Typically 60-80% of the electricity which is used in the industrial sector and about 35% of the electricity used in the commercial sector in the European Union is consumed by motors. In industry, a motor consumes an annual quantity of electricity which corresponds to approximately 5 times its purchase price, throughout its whole life of around 12 to 20 years. Motors are by far the most important type of electric load. They are used in all sectors and in a wide range of applications, namely the following: fans, compressors, pumps, mills, winders, elevators, transports, home appliances, and office equipment, etc. It is their wide use that makes motor drive systems one of the main targets to achieve significant energy savings. As motors are the largest users of electrical energy, even small efficiency improvements will produce very large energy savings.

*Induction Machines Handbook* CRC Press

This is the first comprehensive book on sensorless high performance a.c. drives. It is essential reading for anyone interested in acquiring a solid background on sensorless torque-controlled drives. It presents a detailed and unified treatment of sensorless vector-controlled and direct-torque

controlled drive systems. It also discusses the applications of artificial intelligence to drives. Where possible, space vector theory is used and emphasis is laid on detailed mathematical and physical analysis. Sensorless drive schemes for different types of permanent magnet synchronous motors, synchronous reluctance motors, and induction motors are also presented. These include more than twenty vector drives e.g. five types of MRAS-based vector drives, and eleven types of direct-torque-controlled (DTC) drives, e.g. the ABB DTC drive. However, torque-controlled switched reluctance motor drives are also discussed due to their emerging importance. The book also covers various drive applications using artificial intelligence (fuzzy logic, neural networks, fuzzy-neural networks) and AI-based modelling of electrical machines. Finally, self-commissioning techniques are also discussed. This is a comprehensive thoroughly up-to-date, and self-contained book suitable for students at various levels, teachers, and industrial readership. Peter Vas is a Professor at the Department of Engineering at the University of Aberdeen, UK, where he is also the Head of the Intelligent Motion Control Group. His previous books published by Oxford University Press are extensively used worldwide.

*The Induction Machine Handbook* CRC Press

Linear electric motors (LEMS) produce directly linear, progressive or oscillatory linear motion through electromagnetic forces. LEMS enjoy small, but very dynamic, worldwide markets in various applications, such as urban and airport people movers, loudspeakers, relays, door-lock openers, magnetic bearings, vibrators, refrigerator compressors, and small vacuum or liquid pumps. This book discusses linear induction motors, linear permanent magnetic synchronous motors, linear permanent magnet pulse motors, linear (plunger) solenoids with fast response, and linear oscillomotors. A disk containing Mathcad codes for the examples is included

*High Performance Control of AC Drives with Matlab/Simulink* PHI Learning Pvt. Ltd.

Developments in power electronics and digital control have made the rugged, low-cost, high-performance induction machine the popular choice of electric generator/motor in many industries. As the induction machine proves to be an efficient power solution for the flexible, distributed systems of the near future, the dynamic worldwide market continues to grow. It is imperative that engineers have a solid grasp of the complex issues of analysis and design associated with these devices. The Induction Machines Design Handbook, Second Edition satisfies this need, providing a comprehensive, self-contained, and up-to-date reference on single- and three-phase induction machines in constant and variable speed applications. Picking up where the first edition left off, this book taps into the authors' considerable field experience to fortify and summarize the rich existing literature on the subject. Without drastically changing the effective logical structure and content of the original text, this second edition acknowledges notable theoretical and practical developments in the field that have occurred during the eight years since the first publication. It makes corrections and/or improvements to text, formulae, and figures. New material includes: Introduction of more realistic specifications and reworked numerical calculations in some of the examples Changes in terminology Discussion of some novel issues, with illustrative results from recent literature New and updated photos Data on new mild magnetic materials (metglass) An industrial "sinusoidal" two-phase winding Illustrations of finite element method airgap flux density Enhanced presentations of unbalanced voltage and new harmonic-rich voltage supply IM performance Discussion of stator (multiconductor) winding skin effect by finite element method Broad coverage of induction machines includes applications, principles and topologies, and materials, with numerical examples, analysis of transient behavior waveforms and digital simulations, and design sample cases. The authors address both standard and new subjects of induction machines in a way that will be both practically useful and inspirational for the future endeavors of professionals and students alike.

*Sensorless Vector and Direct Torque Control* Springer Science & Business Media

Synchronous Generators, the first of two volumes in the Electric Generators Handbook, offers a thorough introduction to electrical energy and electricity generation, including the basic principles of electric generators. The book devotes a chapter to the most representative prime mover models for transients used in active control of various generators. Then, individual chapters explore large- and medium-power synchronous generator topologies, steady state, modeling, transients, control, design, and testing. Numerous case studies, worked-out examples, sample results, and illustrations highlight the concepts. Fully revised and updated to reflect the last decade's worth of progress in the field, this Second Edition adds new sections that: Discuss high-power wind generators with fewer or no permanent magnets (PMs) Cover PM-assisted DC-excited salient pole synchronous generators Present multiphase synchronous machine inductances via the winding function method Consider the control of autonomous synchronous generators Examine additional optimization design issues Illustrate the optimal design of a large wind generator by the Hooke-Jeeves method Detail the magnetic equivalent circuit population-based optimal design of synchronous generators Address online identification of synchronous generator parameters Explain the small-signal injection online technique Explore line switching (on or off) parameter identification for isolated grids Describe synthetic back-to-back load testing with inverter supply The promise of renewable, sustainable energy rests on our ability to design innovative power systems that are able to harness energy from a variety of sources. Synchronous Generators, Second Edition supplies state-of-the-art tools necessary to design, validate, and deploy the right power generation technologies to fulfill tomorrow's complex energy needs.

*Electric Generators Handbook - Two Volume Set* MacMillan Publishing Company

Often called the workhorse of industry, the advent of power electronics and advances in digital control are transforming the induction motor into the racehorse of industrial motion control. Now, the classic texts on induction machines are nearly three decades old, while more recent books on electric motors lack the necessary depth and detail on ind

*Handbook of Automotive Power Electronics and Motor Drives* CRC Press

Electric Generators Handbook, Second Edition: Two-Volume Set supplies state-of-the-art tools necessary to design, validate, and deploy the right power generation technologies to fulfill tomorrow's complex energy needs. The first volume, Synchronous Generators, explores large- and medium-power synchronous generator topologies, steady state, modeling, transients, control, design, and testing. Numerous case studies, worked-out examples, sample results, and illustrations highlight the concepts. Fully revised and updated to reflect the last decade's worth of progress in the field, the Second Edition adds coverage of high-power wind generators with fewer or no PMs, PM-assisted DC-excited salient pole synchronous generators, autonomous synchronous generators' control, line switching parameter identification for isolated grids, synthetic back-to-back load testing with inverter supply, and more. The second volume, Variable Speed Generators, provides extensive coverage of variable speed generators in distributed

generation and renewable energy applications around the world. Numerous design and control examples illustrate the exposition. Fully revised and updated to reflect the last decade's worth of progress in the field, the Second Edition adds material on doubly fed induction generator control under unbalanced voltage sags and nonlinear loads, interior permanent magnet claw-pole-alternator systems, high power factor Vernier PM generators, PM-assisted reluctance synchronous motors/generators for electric hybrid vehicles, and more.

*Electric Machines* John Wiley & Sons

High Performance Control of AC Drives with Matlab®/Simulink Explore this indispensable update to a popular graduate text on electric drive techniques and the latest converters used in industry The Second Edition of High Performance Control of AC Drives with Matlab®/Simulink delivers an updated and thorough overview of topics central to the understanding of AC motor drive systems. The book includes new material on medium voltage drives, covering state-of-the-art technologies and challenges in the industrial drive system, as well as their components, and control, current source inverter-based drives, PWM techniques for multilevel inverters, and low switching frequency modulation for voltage source inverters. This book covers three-phase and multiphase (more than three-phase) motor drives including their control and practical problems faced in the field (e.g., adding LC filters in the output of a feeding converter), are considered. The new edition contains links to Matlab®/Simulink models and PowerPoint slides ideal for teaching and understanding the material contained within the book. Readers will also benefit from the inclusion of: A thorough introduction to high performance drives, including the challenges and requirements for electric drives and medium voltage industrial applications An exploration of mathematical and simulation models of AC machines, including DC motors and squirrel cage induction motors A treatment of pulse width modulation of power electronic DC-AC converter, including the classification of PWM schemes for voltage source and current source inverters Examinations of harmonic injection PWM and field-oriented control of AC machines Voltage source and current source inverter-fed drives and their control Modelling and control of multiphase motor drive system Supported with a companion website hosting online resources. Perfect for senior undergraduate, MSc and PhD students in power electronics and electric drives, High Performance Control of AC Drives with Matlab®/Simulink will also earn a place in the libraries of researchers working in the field of AC motor drives and power electronics engineers in industry.

*Linear Synchronous Motors* John Wiley & Sons

This Second Edition extensively covers advanced issues/subjects in electric machines, starting from principles, to applications and case studies with ample graphical (numerical) results. This textbook is intended for second (and third) semester courses covering topics such as modeling of transients, control principles, electromagnetic and thermal finite element analysis, and optimal design (dimensioning). Notable recent knowledge with strong industrialization potential has been added to this edition, such as: Orthogonal models of multiphase a.c. machines Thermal Finite Element Analysis of (FEA) electric machines FEA-based-only optimal design of a PM motor case study Line start synchronizing premium efficiency PM induction machines Induction machines (three and single phase), synchronous machines with DC excitation, with PM-excitation, and with magnetically salient rotor and a linear Pm oscillatory motor are all investigated in terms of transients, electromagnetic FEM analysis and control principles. Case studies, numerical examples, and lots of discussion of FEM results for PMSM and IM are included throughout the book. The optimal design is treated in detail using Hooke-Jeeves and GA algorithms with case comparison studies in dedicated chapters for IM and PMSM. Numerous computer simulation programs in MATLAB® and Simulink® are available online that illustrate performance characteristics present in the chapters, and the FEM and optimal design case studies (and codes) may be used as homework to facilitate a deeper understanding of fundamental issues.

*Industrial Power Distribution and Illuminating Systems* John Wiley & Sons

The switched reluctance machine (SRM) is the least expensive electrical machine to produce, yet one of the most reliable. As such, research has blossomed during the last decade, and the SRM and variable drive systems using SRMs are receiving considerable attention from industry. Because they require a power electronic converter and controller to function, however, successful realization of an SRM variable drive system demands an understanding of the converter and controller subsystems and their integration with the machine. Switched Reluctance Motor Drives provides that understanding. It presents a unified view of the machine and its drive system from all of its system and subsystem aspects. With a careful balance of theory and implementation, the author develops the analysis and design of SRMs from first principles, introduces a wide variety of power converters available for driving the SRM, and systematically presents both low- and high-performance controllers. The book includes an in-depth study of acoustic noise and its minimization along with application examples that include comparisons between ac and dc drives and SRM drive. The result is the first book that provides a state-of-the-art knowledge of SRMs, power converters, and their use with both sensor-based and sensorless controllers. Switched Reluctance Motor Drives enables both students and engineers to learn all aspects of SRM drive systems and appreciate the interdependence of the various subsystems in performance optimization.

*Electric Machines* CRC Press

A unique approach to sensorless control and regulator design of electric drives Based on the author's vast industry experience and collaborative works with other industries, Control of Electric Machine Drive Systems is packed with tested, implemented, and verified ideas that engineers can apply to everyday problems in the field. Originally published in Korean as a textbook, this highly practical updated version features the latest information on the control of electric machines and apparatus, as well as a new chapter on sensorless control of AC machines, a topic not covered in any other publication. The book begins by explaining the features of the electric drive system and trends of development in related technologies, as well as the basic structure and operation principles of the electric machine. It also addresses steady state characteristics and control of the machines and the transformation of physical variables of AC machines using reference frame theory in order to provide a proper foundation for the material. The heart of the book reviews several control algorithms of electric machines and power converters, explaining active damping and how to regulate current, speed, and position in a feedback manner. Seung-Ki Sul introduces tricks to enhance the control performance of the electric machines, and the algorithm to detect the phase angle of an AC source and to control DC link voltages of power converters. Topics also covered are: Vector control Control algorithms for position/speed sensorless drive of AC machines Methods for identifying the parameters of electric machines and power converters The matrix algebra to model a three-phase AC machine in d-q-n axes Every chapter features exercise problems drawn from actual industry experience. The book also includes more than 300 figures and offers access to an FTP site, which provides MATLAB programs for selected problems.

The book's practicality and realworld relatability make it an invaluable resource for professionals and engineers involved in the research and development of electric machine drive business, industrial drive designers, and senior undergraduate and graduate students. To obtain instructor materials please send an email to [pressbooks@ieee.org](mailto:pressbooks@ieee.org) To visit this book's FTP site to download MATLAB codes, please click on this link: [ftp://ftp.wiley.com/public/sci\\_tech\\_med/electric\\_machine/](ftp://ftp.wiley.com/public/sci_tech_med/electric_machine/) MATLAB codes are also downloadable from Wiley Booksupport Site at <http://booksupport.wiley.com>

**Control of Electric Machine Drive Systems** CRC Press

Electric Drives provides a practical understanding of the subtleties involved in the operation of modern electric drives. The Third Edition of this bestselling textbook has been fully updated and greatly expanded to incorporate the latest technologies used to save energy and increase productivity, stability, and reliability. Every phrase, equation, number, and reference in the text has been revisited, with the necessary changes made throughout. In addition, new references to key research and development activities have been included to accurately reflect the current state of the art. Nearly 120 new pages covering recent advances, such as those made in the sensorless control of A.C. motor drives, have been added; as have two new chapters on advanced scalar control and multiphase electric machine drives. All solved numerical examples have been retained, and the 10 MATLAB®-Simulink® programs remain online. Thus, Electric Drives, Third Edition offers an up-to-date synthesis of the basic and advanced control of electric drives, with ample material for a two-semester course at the university level.

**Electric Vehicle Machines and Drives** Taylor & Francis

This second edition extensively covers advanced issues/subjects in electric machines, starting from principles, to applications and case studies with ample graphical (numerical) results. This textbook is intended for second (and third) semester course, treating topics such as modeling of transients, control principles, electromagnetic and thermal finite element Analysis and optimal design (dimensioning)

**Modern Electrical Drives** CRC Press

This book covers the complete syllabi prescribed for undergraduate courses in electrical, electronics, mechanical and instrumentation engineering offered by various Indian universities. The objective of this text is to provide thorough knowledge in the emerging field of special electrical machines. It discusses the stepper motor, switched reluctance motor, permanent magnet dc and ac motors, brushless dc motors, single phase special electric motors, servomotors, linear electric machines and permanent magnet axial flux machines. Key Features • Chapter on permanent magnet axial flux machines (not available in other Indian authors' books) • Numerous worked-out examples • Based on classroom tested materials • Simplified mathematical analysis Besides undergraduate students, the book will also be useful to the postgraduate students specialising in drives and control, power electronics, control systems and mechatronics.

**Modelling and Control of Switched Reluctance Machines** BoD – Books on Demand

Initially, the only electric loads encountered in an automobile were for lighting and the starter motor. Today, demands on performance, safety, emissions, comfort, convenience, entertainment, and communications have seen the working-in of seemingly innumerable advanced electronic devices. Consequently, vehicle electric systems require larger capacities and more complex configurations to deal with these demands. Covering applications in conventional, hybrid-electric, and electric vehicles, the Handbook of Automotive Power Electronics and Motor Drives provides a comprehensive reference for automotive electrical systems. This authoritative handbook features contributions from an outstanding international panel of experts from industry and academia, highlighting existing and emerging technologies. Divided into five parts, the Handbook of Automotive Power Electronics and Motor Drives offers an overview of automotive power systems, discusses semiconductor devices, sensors, and other components, explains different power electronic converters, examines electric machines and associated drives, and details various advanced electrical loads as well as battery technology for automobile applications. As we seek to answer the call for safer, more efficient, and lower-emission vehicles from regulators and consumer insistence on better performance, comfort, and entertainment, the technologies outlined in this book are vital

for engineering advanced vehicles that will satisfy these criteria.

**Linear Electric Machines, Drives, and MAGLEVs Handbook** CRC Press

Considered to be the first book devoted to the subject, Linear Synchronous Motors: Transportation and Automation Systems, Second Edition evaluates the state of the art, demonstrating the technological innovations that are improving the design, construction, and performance of modern control systems. This new edition not only illustrates the development of linear synchronous motor drives, but it also discusses useful techniques for selecting a motor that will meet the specific requirements of linear electrical drives. New Features for the Second Edition: Several updated and expanded sections, as well as two new chapters on FEM Even more numerical examples, calculations, and mathematical models Broadened target audience that includes researchers, scientists, students, and more Evaluating trends and practical techniques for achieving optimal system performance, the authors showcase ready-to-implement solutions for common roadblocks in this process. The book presents fundamental equations and calculations used to determine and evaluate system operation, efficiency, and reliability, with an exploration of modern computer-aided design of linear synchronous motors, including the finite element approach. It covers topics such as linear sensors and stepping motors, magnetic levitation systems, elevators, and factory automation systems. It also features case studies on flat PM, tubular PM, air-cored, and hybrid linear synchronous motors, as well as 3D finite element method analysis of tubular linear reluctance motors, and linear oscillatory actuators. With such an exceptional presentation of practical tools and conceptual illustrations, this volume is an especially powerful resource. It will benefit readers from all walks by providing numerical examples, models, guidelines, and diagrams to help develop a clear understanding of linear synchronous motor operations, characteristics, and much more.

**SPECIAL ELECTRICAL MACHINES** CRC Press

Fully updated throughout, Electric Vehicle Technology, Second Edition, is a complete guide to the principles, design and applications of electric vehicle technology. Including all the latest advances, it presents clear and comprehensive coverage of the major aspects of electric vehicle development and offers an engineering-based evaluation of electric motor scooters, cars, buses and trains. This new edition includes: important new chapters on types of electric vehicles, including pickup and linear motors, overall efficiencies and energy consumption, and power generation, particularly for zero carbon emissions expanded chapters updating the latest types of EV, types of batteries, battery technology and other rechargeable devices, fuel cells, hydrogen supply, controllers, EV modeling, ancillary system design, and EV and the environment brand new practical examples and case studies illustrating how electric vehicles can be used to substantially reduce carbon emissions and cut down reliance on fossil fuels futuristic concept models, electric and high-speed trains and developments in magnetic levitation and linear motors an examination of EV efficiencies, energy consumption and sustainable power generation. MATLAB® examples can be found on the companion website [www.wiley.com/go/electricvehicle2e](http://www.wiley.com/go/electricvehicle2e) Explaining the underpinning science and technology, this book is essential for practicing electrical, automotive, power, control and instrumentation engineers working in EV research and development. It is also a valuable reference for academics and students in automotive, mechanical, power and electrical engineering.

**Electric Drives** CRC Press

Linear electric actuators (LEAs) and linear electric generators (LEGs) are widely used electromagnetic devices. This book deals with LEAs that convert electric energy into controlled mechanical motion of limited travel and LEGs that transform mechanical energy into electric energy. Examples range from loudspeakers and microphones to magnetically levitated material transfer in ultraclean rooms. Much of the literature on linear actuators and generators covers the principles of operation and performance calculations of these devices. Little has been published on their control or on detailed design methodologies. This book presents the first unified treatment of the subject, including the construction, operation, control and design of LEAs and LEGs. Chapters describe linear induction, permanent-magnet, linear reluctance, switched reluctance, and linear stepper actuators, as well as various types of linear electric generators. The text is amply illustrated with numerous design examples.

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