
Electric Motor Drives Modelling And Analysis Krishnan

Electric Vehicle Machines and Drives
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Electric Vehicle Machines and Drives

John Wiley & Sons

Electric motors are the largest consumer of electric energy and they play a critical role in the growing market for electrification. Due to their simple construction, switched reluctance motors (SRMs) are exceptionally attractive for the industry to respond to the increasing demand for high-efficiency, high-performance, and low-cost electric motors with a more secure supply chain. Switched Reluctance Motor Drives: Fundamentals to Applications is a comprehensive textbook covering the major aspects of switched reluctance motor drives. It provides an overview of the use of electric motors in

the industrial, residential, commercial, and transportation sectors. It explains the theory behind the operation of switched reluctance motors and provides models to analyze them. The book extensively concentrates on the fundamentals and applications of SRM design and covers various design details, such as materials, mechanical construction, and controls. Acoustic noise and vibration is the most well-known issue in switched reluctance motors, but this can be reduced significantly through a multidisciplinary approach. These methodologies are explained in two chapters of the book. The first covers the fundamentals of acoustic noise and vibration so readers have the necessary tools to analyze the problems and explains the surface waves, spring-mass models, forcing harmonics, and mode shapes that are utilized in modeling and analyzing acoustic noise and

vibration. The second applies these fundamentals to switched reluctance motors and provides examples for determining the sources of any acoustic noise in switched reluctance motors. In the final chapter two SRM designs are presented and proposed as replacements for permanent magnet machines in a residential HVAC application and a hybrid-electric propulsion application. It also shows a high-power and compact converter design for SRM drives. Features: Comprehensive coverage of switched reluctance motor drives from fundamental principles to design, operation, and applications A specific chapter on electric motor usage in industrial, residential, commercial, and transportation applications to address the benefits of switched reluctance machines Two chapters address acoustic noise and vibration in detail Numerous illustrations

and practical examples on the design, modeling, and analysis of switched reluctance motor drives Examples of switched reluctance motor and drive design

Permanent Magnet Brushless DC Motor Drives and Controls John Wiley & Sons
Dynamics is a science concerned with movement and changes. In the most general approach it relates to life processes as well as behavior in nature in rest. It governs small particles, technical objects, conversion of matter and materials but also concerns people, groups of people in their individual and, in particular, social dimension. In dynamics we always have to do with causes or stimuli for motion, the rules of reaction or behavior and its result in the form of trajectory of changes. This book is devoted to dynamics of a wide class of specific but very important objects such as electromechanical systems. This is a very rigorous discipline and has a long tradition, as its theoretical bases were formulated in the first half of the XIX century by d' Alembert, Lagrange, Hamilton, Maxwell and other prominent scientists, but their crucial results were based on previous pioneering research of others such as Copernicus, Galileo, Newton... This book in its theoretical foundations is based on the principle of least action which governs classical as well as relativistic mechanics and electromagnetism and leads to Lagrange's equations which are applied in the book as universal method to construct equations of motion of electromechanical systems. It gives common and coherent grounds to formulate mathematical models for all lumped parameters' electromechanical systems, which are vital in our contemporary industry and civilized everyday life. From these remarks it seems that the book is general and theoretical but in fact it is a very practical one concerning modern electrical drives in a broad sense, including electromechanical energy conversion, induction motor drives, brushless DC drives with a permanent magnet excitation and switched reluctance machines (SRM). And of course their control, which means shaping of their trajectories of motion using modern tools, their designed autonomy in keeping a track according to our programmed expectations. The problems presented in the book are widely illustrated by characteristics, trajectories, dynamic courses all computed by use of developed simulation models throughout the book. There are some classical subjects and the history of the discipline is discussed but

finally all modern tools and means are presented and applied. More detailed descriptions follow in abstracts for the particular chapters. The author hopes kind readers will enjoy and profit from reading this book.

Modelling Analysis and Control

Elsevier

This book provides a unique approach to derive model-based torque controllers for all types of Lorentz force machines, i.e. DC, synchronous and induction machines. The rotating transformer model forms the basis for the generalized modeling approach of rotating field machines, which leads to the development of universal field-oriented control algorithms. Contrary to this, direct torque control algorithms, using observer-based methods, are developed for switched reluctance machines. Tutorials are included at the end of each chapter, and the reader is encouraged to execute these tutorials in order to gain familiarity with the dynamic behavior of drive systems. This updated edition uses PLECS® simulation and vector processing tools that were specifically adopted for the purpose of these hands-on tutorials. Hence, *Advanced Electrical Drives* encourages "learning by doing" and the experienced drive specialist may find the simulation tools useful to design high-performance torque controllers. Although it is a powerful reference in its own right, when used in conjunction with the companion texts *Fundamentals of Electrical Drives* and *Applied Control of Electrical Drives*, this book provides a uniquely comprehensive reference set that takes readers all the way from understanding the basics of how electrical drives work, to deep familiarity with advanced features and models, to a mastery of applying the concepts to actual hardware in practice. Teaches readers to perform insightful analysis of AC electrical machines and drives; Introduces new modeling methods and modern control techniques for switched reluctance drives; Updated to use PLECS® simulation tools for modeling electrical drives, including new and more experimental results; Numerous tutorials at end of each chapter to learn by doing, step-by-step; Includes extra material featuring "build and play" lab modules, for lectures and self-study.
Magnetic Material for Motor Drive Systems CRC Press
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
Induction Motor Control Design CRC Press
Written for non-specialist users of electric motors and drives, this book explains how electric drives work and compares the performance of the main systems, with many examples of applications. The author's approach - using a minimum of mathematics - has made this book equally popular as an outline for professionals and an introductory student text. * First edition (1990) has sold over 6000 copies. *Drives and Controls* on the first edition: 'This book is very readable, up-to-date and should be extremely useful to both users and o.e.m. designers. I unhesitatingly recommend it to any busy engineer who needs to make informed judgements about selecting the right drive system.' New features of the second edition: * New section on the cycloconverter drive. * More on switched reluctance motor drives. * More on vector-controlled induction motor drives. * More on power switching devices. * New 'question and answer' sections on common problems and misconceptions. * Updating throughout. *Electric Motors and Drives* is for non-specialist users of electric motors and drives. It fills the gap between specialist textbooks (which are pitched at a level which is too academic for the average user) and the more prosaic 'handbooks' which are filled with useful detail but provide little opportunity for the development of any real insight or understanding. The book explores most of the widely-used modern types of motor and drive, including conventional and brushless d.c., induction motors (mains and inverter-fed), stepping motors, synchronous motors (mains and converter-fed) and reluctance motors.
Principles, Application and Design Springer Science & Business Media
Despite two decades of massive strides in research and development on control strategies and their subsequent implementation, most books on permanent magnet motor drives still focus primarily on motor design, providing only elementary coverage of control and converters. Addressing that gap with information that has largely been disseminated only in journals and at conferences, *Permanent Magnet Synchronous and Brushless DC Motor Drives* is a long-awaited comprehensive overview of power electronic converters for permanent magnet synchronous

machines and control strategies for variable-speed operation. It introduces machines, power devices, inverters, and control, and addresses modeling, implementation, control strategies, and flux weakening operations, as well as parameter sensitivity, and rotor position sensorless control. Suitable for both industrial and academic audiences, this book also covers the simulation, low cost inverter topologies, and commutation torque ripple of PM brushless DC motor drives. Simulation of the motor drives system is illustrated with MATLAB® codes in the text. This book is divided into three parts—fundamentals of PM synchronous and brushless dc machines, power devices, inverters; PM synchronous motor drives, and brushless dc motor drives. With regard to the power electronics associated with these drive systems, the author: Explores use of the standard three-phase bridge inverter for driving the machine, power factor correction, and inverter control Introduces space vector modulation step by step and contrasts with PWM Details dead time effects in the inverter, and its compensation Discusses new power converter topologies being considered for low-cost drive systems in PM brushless DC motor drives This reference is dedicated exclusively to PM ac machines, with a timely emphasis on control and standard, and low-cost converter topologies. Widely used for teaching at the doctoral level and for industrial audiences both in the U.S. and abroad, it will be a welcome addition to any engineer's library.

High Performance AC Drives CRC Press
The Industrial Electronics Handbook, Second Edition combines traditional and newer, more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high-power applications. Embracing the broad technological scope of the field, this collection explores fundamental areas, including analog and digital circuits, electronics, electromagnetic machines, signal processing, and industrial control and communications systems. It also facilitates the use of intelligent systems—such as neural networks, fuzzy systems, and evolutionary methods—in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components. Enhancing its value, this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal, one of the largest and most respected publications in

the field. Power Electronics and Motor Drives facilitates a necessary shift from low-power electronics to the high-power varieties used to control electromechanical systems and other industrial applications. This volume of the handbook: Focuses on special high-power semiconductor devices Describes various electrical machines and motors, their principles of operation, and their limitations Covers power conversion and the high-efficiency devices that perform the necessary switchover between AC and DC Explores very specialized electronic circuits for the efficient control of electric motors Details other applications of power electronics, aside from electric motors—including lighting, renewable energy conversion, and automotive electronics Addresses power electronics used in very-high-power electrical systems to transmit energy Other volumes in the set: Fundamentals of Industrial Electronics Control and Mechatronics Industrial Communication Systems Intelligent Systems
Design, Analysis and Application Springer Science & Business Media
Electric machines have a ubiquitous presence in our modern daily lives, from the generators that supply electricity to motors of all sizes that power countless applications. Providing a balanced treatment of the subject, *Electric Machines and Drives: Principles, Control, Modeling, and Simulation* takes a ground-up approach that emphasizes fundamental principles. The author carefully deploys physical insight, mathematical rigor, and computer simulation to clearly and effectively present electric machines and drive systems. Detailing the fundamental principles that govern electric machines and drives systems, this book: Describes the laws of induction and interaction and demonstrates their fundamental roles with numerous examples Explores dc machines and their principles of operation Discusses a simple dynamic model used to develop speed and torque control strategies Presents modeling, steady state based drives, and high-performance drives for induction machines, highlighting the underlying physics of the machine Includes coverage of modeling and high performance control of permanent magnet synchronous machines Highlights the elements of power electronics used in electric drive systems Examines simulation-based optimal design and numerical simulation of dynamical systems Suitable for a one semester class at the senior undergraduate or a graduate level, the text supplies simulation cases that can be used as a base and can be

supplemented through simulation assignments and small projects. It includes end-of-chapter problems designed to pick up on the points presented in chapters and develop them further or introduce additional aspects. The book provides an understanding of the fundamental laws of physics upon which electric machines operate, allowing students to master the mathematical skills that their modeling and analysis requires.

Predictive Control of Power Converters and Electrical Drives CRC Press

Electric Motor Drives Modeling, Analysis, and Control Pearson

Control Strategies of Permanent Magnet Synchronous Motor Drive for Electric Vehicle Springer Nature

This book is part of a three-book series. Ned Mohan has been a leader in EES education and research for decades, as author of the best-selling text/reference *Power Electronics*. This book emphasizes applications of electric machines and drives that are essential for wind turbines and electric and hybrid-electric vehicles. The approach taken is unique in the following respects: A systems approach, where Electric Machines are covered in the context of the overall drives with applications that students can appreciate and get enthusiastic about; A fundamental and physics-based approach that not only teaches the analysis of electric machines and drives, but also prepares students for learning how to control them in a graduate level course; Use of the space-vector-theory that is made easy to understand. They are introduced in this book in such a way that students can appreciate their physical basis; A unique way to describe induction machines that clearly shows how they go from the motoring-mode to the generating-mode, for example in wind and electric vehicle applications, and how they ought to be controlled for the most efficient operation.

Analysis, Control, and Modeling Using MATLAB / Simulink Wiley Global Education

With nearly two-thirds of global electricity consumed by electric motors, it should come as no surprise that their proper control represents appreciable energy savings. The efficient use of electric drives also has far-reaching applications in such areas as factory automation (robotics), clean transportation (hybrid-electric vehicles), and renewable (wind and solar) energy resource management. Advanced Electric Drives utilizes a physics-based approach to explain the fundamental concepts of modern electric drive control and its operation under dynamic

conditions. Author Ned Mohan, a decades-long leader in Electrical Energy Systems (EES) education and research, reveals how the investment of proper controls, advanced MATLAB and Simulink simulations, and careful forethought in the design of energy systems translates to significant savings in energy and dollars. Offering students a fresh alternative to standard mathematical treatments of dq-axis transformation of a-b-c phase quantities, Mohan's unique physics-based approach "visualizes" a set of representative dq windings along an orthogonal set of axes and then relates their currents and voltages to the a-b-c phase quantities. *Advanced Electric Drives* is an invaluable resource to facilitate an understanding of the analysis, control, and modelling of electric machines.

- Gives readers a "physical" picture of electric machines and drives without resorting to mathematical transformations for easy visualization
- Confirms the physics-based analysis of electric drives mathematically
- Provides readers with an analysis of electric machines in a way that can be easily interfaced to common power electronic converters and controlled using any control scheme
- Makes the MATLAB/Simulink files used in examples available to anyone in an accompanying website
- Reinforces fundamentals with a variety of discussion questions, concept quizzes, and homework problems

Electric Motor Control *Electric Motor Drives Modeling, Analysis, and Control* Power Electronics and Motor Drive Systems is designed to aid electrical engineers, researchers, and students to analyze and address common problems in state-of-the-art power electronics technologies. Author Stefanos Manias supplies a detailed discussion of the theory of power electronics circuits and electronic power conversion technology systems, with common problems and methods of analysis to critically evaluate results. These theories are reinforced by simulation examples using well-known and widely available software programs, including SPICE, PSIM, and MATLAB/SIMULINK. Manias expertly analyzes power electronic circuits with basic power semiconductor devices, as well as the new power electronic converters. He also clearly and comprehensively provides an analysis of modulation and output voltage, current control techniques, passive and active filtering, and the characteristics and gating circuits of different power semiconductor switches, such as BJTs, IGBTs, MOSFETs, IGCTs, MCTs and GTOs. Includes step-by-step analysis of power

electronic systems Reinforced by simulation examples using SPICE, PSIM, and MATLAB/SIMULINK Provides 110 common problems and solutions in power electronics technologies

Fusion Technology of Electromagnetic Fields John Wiley & Sons

Encouraged by the response to the first edition and to keep pace with recent developments, *Fundamentals of Electrical Drives, Second Edition* incorporates greater details on semi-conductor controlled drives, includes coverage of permanent magnet AC motor drives and switched reluctance motor drives, and highlights new trends in drive technology. Contents were chosen to satisfy the changing needs of the industry and provide the appropriate coverage of modern and conventional drives. With the large number of examples, problems, and solutions provided, *Fundamentals of Electrical Drives, Second Edition* will continue to be a useful reference for practicing engineers and for those preparing for Engineering Service Examinations.

Electric Motor Drives and their Applications with Simulation Practices Pearson

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.

High Performance Control of AC Drives with Matlab/Simulink Elsevier

Electronic Control of Machines develops a systematic approach to motor drives. This book places emphasis on practice through the use of extensive modeling, simulation

and analysis to help readers better understand the subject. Detailed industrial applications help readers relate theory to practice. KEY TOPICS: This extensive book cover numerous topics including: system level analysis, design and integration of the motor drives; and modeling and analysis of electrical machines and drive systems. MARKET: For readers with an interest in electric drives and power electronics.

Power Electronics and Motor Drives John Wiley & Sons

Power Electronics and Motor Drives: Advances and Trends, Second Edition is the perfect resource to keep the electrical engineer up-to-speed on the latest advancements in technologies, equipment and applications. Carefully structured to include both traditional topics for entry-level and more advanced applications for the experienced engineer, this reference sheds light on the rapidly growing field of power electronic operations. New content covers converters, machine models and new control methods such as fuzzy logic and neural network control. This reference will help engineers further understand recent technologies and gain practical understanding with its inclusion of many industrial applications. Further supported by a glossary per chapter, this book gives engineers and researchers a critical reference to learn from real-world examples and make future decisions on power electronic technology and applications. Provides many practical examples of industrial applications Updates on the newest electronic topics with content added on fuzzy logic and neural networks Presents information from an expert with decades of research and industrial experience

Modeling, Analysis, and Control John Wiley & Sons

Power Electronics and Electric Drives for Traction Applications offers a practical approach to understanding power electronics applications in transportation systems ranging from railways to electric vehicles and ships. It is an application-oriented book for the design and development of traction systems accompanied by a description of the core technology. The first four introductory chapters describe the common knowledge and background required to understand the preceding chapters. After that, each application-specific chapter: highlights the significant manufacturers involved; provides a historical account of the technological evolution experienced; distinguishes the physics and mechanics; and where possible, analyses a real life example and provides the necessary

models and simulation tools, block diagrams and simulation based validations. Key features: Surveys power electronics state-of-the-art in all aspects of traction applications. Presents vital design and development knowledge that is extremely important for the professional community in an original, simple, clear and complete manner. Offers design guidelines for power electronics traction systems in high-speed rail, ships, electric/hybrid vehicles, elevators and more applications. Application-specific chapters co-authored by traction industry expert. Learning supplemented by tutorial sections, case studies and MATLAB/Simulink-based simulations with data from practical systems. A valuable reference for application engineers in traction industry responsible for design and development of products as well as traction industry researchers, developers and graduate students on power electronics and motor drives needing a reference to the application examples. Control of Multiphase Machines and Drives

John Wiley & Sons
 Electric Motor Control: DC, AC, and BLDC Motors introduces practical drive techniques of electric motors to enable stable and efficient control of many application systems, also covering basic principles of high-performance motor control techniques, driving methods, control theories and power converters. Electric motor drive systems play a critical role in home appliances, motor vehicles, robotics, aerospace and transportation, heating ventilating and cooling equipment's, robotics, industrial machinery and other commercial applications. The book provides engineers with drive techniques that will help them develop motor drive system for their applications. Includes practical solutions and control techniques for industrial motor drive applications currently in use Contains MATLAB/Simulink simulation files Enables engineers to understand the applications and advantages of electric motor drive systems Applied Intelligent Control of Induction

Motor Drives CRC Press

This book demonstrates the development of various control strategies and illustration of dynamic performance intensification of a Permanent Magnet Synchronous Motor (PMSM) drive. Performance of a PMSM drive and control strategies executed through mathematical modelling is also discussed including case studies.

Electric Drives Springer Science & Business Media

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

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