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Electric Machines and Drives-Ned Mohan 2011-12-13 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.

Electrical Machines and Drives-Jan A. Melkebeek 2018-01-20 This book aims to offer a thorough study and reference textbook on electrical machines and drives. The basic idea is to start from the pure electromagnetic principles to derive the equivalent circuits and steady-state equations of the most common electrical machines (in the first parts). Although the book mainly concentrates on rotating field machines, the first two chapters are devoted to transformers and DC commutator machines. The chapter on transformers is included as an introduction to induction and synchronous machines, their electromagnetics and equivalent circuits. Chapters three and four offer an in-depth study of induction and synchronous machines, respectively. Starting from their electromagnetics, steady-state equations and equivalent circuits are derived, from which their basic properties can be deduced. The second part discusses the main power-electronic supplies for electrical drives, for example rectifiers, choppers, cycloconverters and inverters. Much attention is paid to PWM techniques for inverters and the resulting harmonic content in the output waveform. In the third part, electrical drives are discussed, combining the traditional (rotating field and DC commutator) electrical machines treated in the first part and the power electronics of part two. Field orientation of induction and synchronous machines are discussed in detail, as well as direct torque control. In addition, also switched reluctance machines and stepping motors are discussed in the last chapters. Finally, part 4 is devoted to the dynamics of traditional electrical machines. Also for the dynamics of induction and synchronous machine drives, the electromagnetics are used as the starting point to derive the dynamic models. Throughout part 4, much attention is paid to the derivation of analytical models. But, of course, the basic dynamic properties and probable causes of instability of induction and synchronous machine drives are discussed in detail as well, with the derived models for stability in the small as starting point. In addition to the study of the stability in the small, a chapter is devoted to large-scale dynamics as well (e.g. sudden short-circuit of synchronous machines). The textbook is used as the course text for the Bachelor's and Master's programme in electrical and mechanical engineering at the Faculty of Engineering and Architecture of Ghent University. Parts 1 and 2 are taught in the basic course 'Fundamentals of Electric Drives' in the third bachelor. Part 3 is used for the course 'Controlled Electrical Drives' in the first master, while Part 4 is used in the specialised master on electrical energy.

Electric Machines and Drives-Shaahin Filizadeh 2013-02-20 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.

Electrical Machine Drives-Claiton Moro Franchi 2019-01-14 This work was developed based on the author's experience of more than 10 years working in research and industry in the areas of electrical drives and industrial automation. Seeking the connection between theory and its applications, the author presents a detailed conceptual description with lots of figures and illustrative examples that harmonize the theoretical approach with the practice. Composed of eleven chapters and three appendices, the book describes in a dynamic and didactic way the fundamental concepts related to the drives of electric machines. At the end of each chapter is a set of exercises to ease the fixation of the presented content.

Electrical Machine Drives Control-Juha Pyrhonen 2016-11-14 This comprehensive text examines existing and emerging electrical drive technologies. The authors clearly define the most basic electrical drive concepts and go on to explain the most important details while maintaining a solid connection to the theory and design of the associated electrical machines. Also including links to a number of industrial applications, the authors take their investigation of electrical drives beyond theory to examine a number of practical aspects of electrical drive control and application. Key features: • Provides a comprehensive summary of all aspects of controlled-speed electrical drive technology including control and operation. • Handling of electrical drives is solidly linked to the theory and design of the associated electrical machines. Added insight into problems and functions are illustrated with clearly understandable figures. • Offers an understanding of the main phenomena associated with electrical machine drives. • Considers the problem of bearing currents and voltage stresses of an electrical drive. • Includes up-to-date theory and design guidelines, taking into account the most recent advances. This book's rigorous coverage of theoretical principles and techniques makes for an excellent introduction to controlled-speed electrical drive technologies for Electrical Engineering MSc or PhD students studying electrical drives. It also serves as an excellent reference for practicing electrical engineers looking to carry out design, analyses, and development of controlled-speed electrical drives.

Linear Electric Machines, Drives, and MAGLEVs Handbook-Ion Boldea 2017-12-19 Based on author Ion Boldea's 40 years of experience and the latest research, Linear Electric Machines, Drives, and Maglevs Handbook provides a practical and comprehensive resource on the steady improvement in this field. The book presents in-depth reviews of basic concepts and detailed explorations of complex subjects, including classifications and practical topologies, with sample results based on an up-to-date survey of the field. Packed with case studies, this state-of-the-art handbook covers topics such as modeling, steady state, and transients as well as control, design, and testing of linear machines and drives. It includes discussion of types and applications—from small compressors for refrigerators to MAGLEV transportation—of linear electric machines. Additional topics include low and high speed linear induction or synchronous motors, with and without PMs, with progressive or oscillatory linear motion, from topologies through modeling, design, dynamics, and control. With a breadth and depth of coverage not found in currently available references, this book includes formulas and methods that make it an authoritative and comprehensive resource for use in R&D and testing of innovative solutions to new industrial challenges in linear electric motion/energy automatic control.

Electric Machines and Drives-Gordon R. Slemon 1992

Electric Motors and Drives-Austin Hughes 2013-10-22 Electric Motors and Drives: Fundamentals, Types and Applications provides information regarding the inner workings of motor and drive system. The book is comprised of nine chapters that cover several aspects and types of motor and drive systems. Chapter 1 discusses electric motors, and Chapter 2 deals with power electronic converters for motor drives. Chapter 3 covers the conventional d.c. motor, while Chapter 4 tackles induction motors - rotating field, slip, and torque. The book also talks about the operating characteristics of induction motors, and then deals with the inverter-fed induction motor drives. The stepping motor systems; the synchronous, switched reluctance, and brushless d.c. drives; and the motor/drive selection are also covered. The text will be of great use to individuals who wish to familiarize themselves with motor and drive systems.

Electrical Machines and Drives-John Hindmarsh 1996-09-19 Recent years have brought substantial developments in electrical drive technology, with the appearance of highly rated, very-high-speed power-electronic switches, combined with microcomputer control systems. This popular textbook has been thoroughly revised and updated in the light of these changes. It retains its successful formula of teaching through worked examples, which are put in context with concise explanations of theory, revision of equations and discussion of the engineering implications. Numerous problems are also provided, with answers supplied. The third edition includes enhanced coverage of power-electronic systems and new material on closed-loop control, in addition to thorough treatment of electrical machines.

Electrical Machines and Drives-J. D. Edwards 1991-05-10 This book gives a thoroughly up-to-date account of the principles of electrical machines and drives in a form accessible to the non-specialist. At the same time, it provides sound groundwork for more advanced studies. It will be of particular value as an introductory textbook for students of electrical and electronic engineering. It features a novel approach to the treatment of classical AC machines based on the concepts of current density and flux density, together with a thorough treatment of the new non-classical electronically commutated machines. Worked examples and problems for solution are included.

Control of Electric Machine Drive Systems-Seung-Ki Sul 2011-04-20 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 reliability 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 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/ MATLAB codes are also downloadable from Wiley Booksupport Site at <http://booksupport.wiley.com>

Introduction to Electric Machines and Drives-D. W. Novotny 2009

Electrical Machines, Drives and Power Systems: Pearson New International Edition-Theodore Wildi 2013-08-29 For courses in Motor Controls, Electric Machines, Power Electronics, and Electric Power. This best-selling text employs a theoretical, practical, multidisciplinary approach to provide introductory students with a broad understanding of modern electric power. The scope of the book reflects the rapid changes that have occurred in power technology over the past few years—allowing the entrance of power electronics into every facet of industrial drives, and expanding the field to open more career opportunities.

Electrical Machines & their Applications-J. Hindmarsh 2014-06-28 A self-contained, comprehensive and unified treatment of electrical machines, including consideration of their control characteristics in both conventional and semiconductor switched circuits. This new edition has been expanded and updated to include material which reflects current thinking and practice. All references have been updated to conform to the latest national (BS) and international (IEC) recommendations and a new appendix has been added which deals more fully with the theory of permanent-magnets, recognising the growing importance of permanent-magnet machines. The text is so arranged that selections can be made from it to give a short course for non-specialists, while the book as a whole will prepare students for more advanced studies in power systems, control systems, electrical machine design and general industrial applications. Includes numerous worked examples and tutorial problems with answers.

Electric Machines and Electric Drives-Nisit K. De 2013-09

Electric Machines and Drives-Miroslav Chomat 2011-02-28 The subject of this book is an important and diverse field of electric machines and drives. The twelve chapters of the book written by renowned authors, both academics and practitioners, cover a large part of the field of electric machines and drives. Various types of electric machines, including three-phase and single-phase induction machines or doubly fed machines, are addressed. Most of the chapters focus on modern control methods of induction-machine drives, such as vector and direct torque control. Among others, the book addresses sensorless control techniques, modulation strategies, parameter identification, artificial intelligence, operation under harsh or failure conditions, and modelling of electric or magnetic quantities in electric machines. Several chapters give an insight into the problem of minimizing losses in electric machines and increasing the overall energy efficiency of electric drives.

Electric Motors and Drives-Austin Hughes 2013-02-20 Electric Motors and Drives is intended for non-specialist users of electric motors and drives, filling the gap between maths- and theory-based academic textbooks and the more prosaic 'handbooks', which provide useful detail but little opportunity for the development of real insight and understanding. The book explores all of the widely-used modern types of motor and drive, including conventional and brushless D.C., induction motors and servo drives, providing readers with the knowledge to select the right technology for a given job. The third edition includes additional diagrams and worked examples throughout. New topics include digital interfacing and control of drives, direct torque control of induction motors and current-fed operation in DC drives. The material on brushless servomotors has also been expanded. Austin Hughes' approach, using a minimum of maths, has established Electric Motors and Drives as a leading guide for electrical engineers and mechanical engineers, and the key to a complex subject for a wider readership, including technicians, managers and students. Acquire knowledge of and understanding of the capabilities and limitations of motors and drives without struggling through unnecessary maths and theory Updated material on the latest and most widely-used modern motors and drives, including brushless servomotors New edition includes additional diagrams and worked examples throughout

Electric Vehicle Machines and Drives-K. T. Chau 2015-05-13 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

Multiphysics Simulation by Design for Electrical Machines, Power Electronics and Drives-Dr. Marius Rosu 2017-11-20 Presents applied theory and advanced simulation techniques for electric machines and drives This book combines the knowledge of experts from both academia and the software industry to present theories of multiphysics simulation by design for electrical machines, power electronics, and drives. The comprehensive design approach described within supports new applications required by technologies sustaining high drive efficiency. The highlighted framework considers the electric machine at the heart of the entire electric drive. The book also emphasizes the simulation by design concept—a concept that frames the entire highlighted design methodology, which is described and illustrated by various advanced simulation technologies. Multiphysics Simulation by Design for Electrical Machines, Power Electronics and Drives begins with the basics of electrical machine design and manufacturing tolerances. It also discusses fundamental aspects of the state of the art design process and includes examples from industrial practice. It explains FEM-based analysis techniques for electrical machine design—providing details on how it can be employed in ANSYS Maxwell software. In addition, the book covers advanced magnetic material modeling capabilities employed in numerical computation; thermal analysis; automated optimization for electric machines; and power electronics and drive systems. This valuable resource: Delivers the multi-physics know-how based on practical electrical machine design methodologies Provides an extensive overview of electric machine design optimization and its integration with power electronics and drives Incorporates case studies from industrial practice and research and development projects Multiphysics Simulation by Design for Electrical Machines, Power Electronics and Drives is an incredibly helpful book for design engineers, application and system engineers, and technical professionals. It will also benefit graduate engineering students with a strong interest in electric machines and drives.

Analysis of Electric Machinery and Drive Systems-Paul Krause 2013-05-22 Introducing a new edition of the popular reference on machine analysis Now in a fully revised and expanded edition, this widely used reference on machine analysis boasts many changes designed to address the varied needs of engineers in the electric machinery, electric drives, and electric power industries. The authors draw on their own extensive research efforts, bringing all topics up to date and outlining a variety of new approaches they have developed over the past decade. Focusing on reference frame theory that has been at the core of this work since the first edition, this volume goes a step further, introducing new material relevant to machine design along with numerous techniques for making the derivation of equations more direct and easy to use. Coverage includes: Completely new chapters on winding functions and machine design that add a significant dimension not found in any other text A new formulation of machine equations for improving analysis and modeling of machines coupled to power electronic circuits Simplified techniques throughout, from the derivation of torque equations and synchronous machine analysis to the analysis of unbalanced operation A unique generalized approach to machine parameters identification A first-rate resource for engineers wishing to master cutting-edge techniques for machine analysis, Analysis of Electric Machinery and Drive Systems is also a highly useful guide for students in the field.

Electric Machines and Drives-Hermann Merz 2002

Artificial-Intelligence-based Electrical Machines and Drives-Peter Vas 1999-01-28 This is the first comprehensive book which discusses numerous AI applications to electrical machines and drives. It presents a detailed and unified mathematical and physical treatment, and contains many worked examples, presents numerous simulation results and shows a large number of experimental results obtained on different DSP systems. It is essential reading for anyone interested in acquiring a solid background in AI-based electrical machines and drives, including students, teachers and other academics, and an industrial readership.

Worked Examples in Electrical Machines and Drives-John Hindmarsh 2013-10-22 Worked Examples in Electrical Machines and Drives discusses methods in predicting and explaining electromechanical performance of several devices. The book is comprised of seven chapters that sequence the examples at increasing levels of difficulty. Chapter 1 provides an introduction and reviews the basic theories. The second chapter covers transformers, and the third chapter tackles d.c. machines. Chapter 4 is concerned with induction machines, while Chapter 5 deals with synchronous machines. Chapter 6 covers transient behavior, and Chapter 7 talks about power-electronic/electrical machine drives. The book will be of great use to students and instructors of schools concerned with electronic devices such as in electrical engineering, and can help enrich their lectures and practical classes.

Reluctance Electric Machines-Ion Boldea 2018-07-20 Electric energy is arguably a key agent for our material prosperity. With the notable exception of photovoltaic generators, electric generators are exclusively used to produce electric energy from mechanical energy. More than 60% of all electric energy is used in electric motors for useful mechanical work in various industries. This book presents the modeling, performance, design, and control of reluctance synchronous and flux-modulation machines developed for higher efficiency and lower cost. It covers one- and three-phase reluctance synchronous motors in line-start applications and various reluctance flux-modulation motors in pulse width modulation converter-fed variable speed drives. "Reluctance motor drives start to find their rightful place in the adjustable speed motor drives. This is in part due to their lower cost, ease of cooling, higher fault tolerance, and suitability for use under harsh operating and ambient condition. The book by Prof. Boldea and Prof. Tutelea offers a physically insightful approach to electromechanical energy conversion in this family of electric machines. Authors provide an in-depth explanation of the electromagnetic performance, interdependence between control and magnetic design and fundamentals of design. I found this book to be a great resource for practicing engineers in industry and researchers in academia. There is an outstanding balance between the theoretical contents and engineering aspects of design and control throughout the manuscript which makes this book an excellent choice for a graduate course in academic institutions or series of short courses for practicing engineers in the industry. I would like to strongly recommend this book for researchers and practitioners in the area of electric machines." —Babak Fahimi, Distinguished Chair of Engineering at University of Texas at Dallas, USA Presents basic and up-to-date knowledge about the topologies, modeling, performance, design, and control of reluctance synchronous machines. Includes information on recently introduced reluctance flux-modulation electric machines (switched- flux, flux-reversal, Vernier, transverse flux, claw pole, magnetic-geared dual-rotor, brushless doubly fed, etc.). Features numerous examples and case studies throughout. Provides a comprehensive overview of all reluctance electric machines.

LabVIEW for Electric Circuits, Machines, Drives, and Laboratories-Nesimi Ertugrul 2002 Master electric circuits, machines, devices, and power electronics hands on-without expensive equipment. In LabVIEW for Electric Circuits, Machines, Drives, and Laboratories Dr. Nesimi Ertugrul uses custom-written LabVIEW Virtual Instruments to illuminate the analysis and operation of a wide range of AC and DC circuits, electrical machines, and drives—including high-voltage/current/power applications covered in no other book. Includes detailed background, VI panels, lab practices, hardware information, and self-study questions - everything you need to achieve true mastery.

Advanced Electric Drives-Ned Mohan 2014-07-22 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

Electrical Machines and Drives-John Hindmarsh 1985

Experiments for Electrical Machines, Drives, and Power Systems-Stephen P. Tubbs 1997 Electric motors, transformers, and control systems are used in all modern industries. Knowledge of the characteristics of these will help the electrical engineering technologist keep the wheels of industry turning. This book will give the student a practical introduction to electrical machinery, transformers, and motor control. The experiments have all been used at the Pennsylvania State University, Mckeesport Campus. There, the full series of experiments were done in two semesters. Each experiment requires about two hours of laboratory time. The book is designed to accompany a textbook. As an added feature, the book also has sections on conducting an experiment, laboratory report writing, accuracy, equipment, and motor runaway.

Advanced Electrical Drives-Rik De Doncker 2010-11-30 Electrical drives convert in a controlled manner, electrical energy into mechanical energy. Electrical drives comprise an electrical machine (i.e. an electro-mechanical energy converter, a power electronic converter, i.e. an electrical-to-electrical converter, and a controller/communication unit. Today, electrical drives are used as propulsion systems in high-speed trains, elevators, escalators, electric ships, electric forklift trucks and electric vehicles. Advanced control algorithms (mostly digitally implemented) allow torque control over a high-bandwidth. Hence, precise motion control can be achieved. Examples are drives in robots, pick-and-place machines, factory automation hardware, etc. Most drives can operate in motoring and generating mode. Wind turbines use electrical drives to convert wind energy into electrical energy. More and more, variable speed drives are used to save energy for example, in air-conditioning units, compressors, blowers, pumps and home appliances. Key to ensure stable operation of a drive in the aforementioned applications are torque control algorithms. In Advanced Electrical Drives, a unique approach is followed 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 this generalized modeling approach that ultimately leads to the development of universal field-oriented control algorithms. In case of switched reluctance machines, torque observers are proposed to implement direct torque algorithms. From a didactic viewpoint, tutorials are included at the end of each chapter. The reader is encouraged to execute these tutorials to familiarize him or herself with all aspects of drive technology. Hence, Advanced Electrical Drives encourages "learning by doing". Furthermore, the experienced drive specialist may find the simulation tools useful to design high-performance controllers for all sorts of electrical drives.

Electric Power Systems-Ned Mohan 2012-01-18 Author Ned Mohan has been a leader in EES education and research for decades. His three-book series on Power Electronics focuses on three essential topics in the power sequence based on applications relevant to this age of sustainable energy such as wind turbines and hybrid electric vehicles. The three topics include power electronics, power systems and electric machines. Key features in the first Edition build on Mohan's successful MNPERE texts; his systems approach which puts dry technical detail in the context of applications; and substantial pedagogical support including PPT's, video clips, animations, clicker questions and a lab manual. It follows a top-down systems-level approach to power electronics to highlight interrelationships between these sub-fields. It's intended to cover fundamental and practical design. This book also follows a building-block approach to power electronics that allows an in-depth discussion of several important topics that are usually left. Topics are carefully sequenced to maintain continuity and interest.

Electrical Machines and Drives-Peter Vas 1992 The operation and analysis of different types of electrical machines and variable-speed drives is described in this book, using space-vector theory. The equations are arranged in forms that can be directly used for computation.

Special Electric Machines-K. Venkataratnam 2009-04-15 This book brings together in a single volume the theory, construction, design, control electronics, and in-depth analysis of several non-traditional machines such as stepper motors, switched reluctance motors, permanent magnet DC machines, brushless DC machines, and linear induction machines. These machines are finding ever-increasing applications, typically in position control systems, robotics and mechatronics, electric vehicles, and high speed transportation. A particular feature of this book is that it does not stop at the basic principles of these complex machines but goes on to cover recent developments and current research, making it useful for senior graduate students and research scholars in the field of electrical machines and drives.

Electric Machines for Smart Grids Applications-Adel El-Shahat 2018-12-12 In this book, highly qualified scientists present their recent research motivated by the importance of electric machines. It addresses advanced studies for high-speed electrical machine design, mechanical design of rotors with surface-mounted permanent magnets, design of motor drive for brushless DC motor, single-phase motors for household applications, battery electric propulsion systems for competition racing applications, robust diagnosis by observer using the bond graph approach, a DC motor simulator based on virtual instrumentation, start-up of a PID fuzzy logic embedded control system for the speed of a DC motor using LabVIEW, advanced control of the permanent magnet synchronous motor and optimization of fuzzy logic controllers by particle swarm optimization to increase the lifetime in power electronic stages.

Electric Drives-Ion Boldea 2016-09-15 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 of motor 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.

Recent Developments of Electrical Drives-Slawomir Wiak 2007-06-08 This book presents papers covering a wide spectrum of theory and practice, deeply rooted in engineering problems at a high practical and theoretical level. The contents explore theory, control systems and applications, the heart of the matter in electrical drives.

Electric Drives and Electromechanical Systems-Richard Crowder 2019-10-19 Electric Drives and Electromechanical Devices: Applications and Control, Second Edition, presents a unified approach to the design and application of modern drive system. It explores problems involved in assembling complete, modern electric drive systems involving mechanical, electrical, and electronic elements. This book provides a global overview of design, specification applications, important design information, and methodologies. This new edition has been restructured to present a seamless, logical discussion on a wide range of topical problems relating to the design and specification of the complete motor-drive system. It is organised to establish immediate solutions to specific application problem. Subsidiary issues that have a considerable impact on the overall performance and reliability, including environmental protection and costs, energy efficiency, and cyber security, are also considered. Presents a comprehensive consideration of electromechanical systems with insights into the complete drive system, including required sensors and mechanical components Features in-depth discussion of control schemes, particularly focusing on practical operation Includes extensive references to modern application domains and real-world case studies, such as electric vehicles Considers the cyber aspects of drives, including networking and security

New Applications of Electric Drives-Miroslav Chomat 2015-12-09 In the last few decades, electric drives have found their place in a considerable number of diverse applications. They are successfully replacing some other traditional types of drives owing to their better performance and excellent controllability. The introduction of electric drives is in most cases also beneficial from the ecological point of view as they are not directly dependent on fossil fuels and an increasing part of electric energy they consume is generated in renewable energy sources. This book focuses on applications of electric drives that emerged only recently and/or novel aspects that appear in them. Particular attention is given to using electric drives in vehicles, aircraft, non-road mobile machinery, and HVAC systems.

Design of Rotating Electrical Machines-Juha Pyrhonen 2013-09-26 In one complete volume, this essential reference presents an in-depth overview of the theoretical principles and techniques of electrical machine design. This timely new edition offers up-to-date theory and guidelines for the design of electrical machines, taking into account recent advances in permanent magnet machines as well as synchronous reluctance machines. New coverage includes: Brand new material on the ecological impact of the motors, covering the eco-design principles of rotating electrical machines An expanded section on the design of permanent magnet synchronous machines, now reporting on the design of tooth-coil, high-torque permanent magnet machines and their properties Large updates and new material on synchronous reluctance machines, air-gap inductance, losses in and resistivity of permanent magnets (PM), operating point of loaded PM circuit, PM machine design, and minimizing the losses in electrical machines-> End-of-chapter exercises and new direct design examples with methods and solutions to real design problems-> A supplementary website hosts two machine design examples created with MATHCAD: rotor surface magnet permanent magnet machine and squirrel cage induction machine calculations. Also a MATLAB code for optimizing the design of an induction motor is provided Outlining a step-by-step sequence of machine design, this book enables electrical machine designers to design rotating electrical machines. With a thorough treatment of all existing and emerging technologies in the field, it is a useful manual for professionals working in the diagnosis of electrical machines and drives. A rigorous introduction to the theoretical principles and techniques makes the book invaluable to senior electrical engineering students, postgraduates, researchers and university lecturers involved in electrical drives technology and electromechanical energy conversion.

Electrical Machines and Drive Systems-Alexandru Fransua 1984

Power Converters and AC Electrical Drives with Linear Neural Networks-Maurizio Cirrione 2017-12-19 The first book of its kind, Power Converters and AC Electrical Drives with Linear Neural Networks systematically explores the application of neural networks in the field of power electronics, with particular emphasis on the sensorless control of AC drives. It presents the classical theory based on space-vectors in identification, discusses control of electrical drives and power converters, and examines improvements that can be attained when using linear neural networks. The book integrates power electronics and electrical drives with artificial neural networks (ANN). Organized into four parts, it first deals with voltage source inverters and their control. It then covers AC electrical drive control, focusing on induction and permanent magnet synchronous motor drives. The third part examines theoretical aspects of linear neural networks, particularly the neural EXIN family. The fourth part highlights original applications in electrical drives and power quality, ranging from neural-based parameter estimation and sensorless control to distributed generation systems from renewable sources and active power filters. Simulation and experimental results are provided to validate the theories. Written by experts in the field, this state-of-the-art book requires basic knowledge of electrical machines and power electronics, as well as some familiarity with control systems, signal processing, linear algebra, and numerical analysis. Offering multiple paths through the material, the text is suitable for undergraduate and postgraduate students, theoreticians, practicing engineers, and researchers involved in applications of ANNs.

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