

Spice For Power Electronics And Electric Power Third Edition Electrical And Computer Engineering By Rashid Muhammad H 2012 Hardcover

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Simulation of Power Electronics Converters Using PLECS® - Farzin Asadi 2019-11-12
Simulation of Power Electronics Converters Using PLECS® is a guide to simulating a power electronics circuit using the latest powerful software for power electronics circuit simulation purposes. This book assists engineers gain an increased understanding of circuit operation so they can, for a given set of specifications, choose a topology, select appropriate circuit component types and values, estimate circuit performance, and complete the design by ensuring that the circuit performance will meet specifications even with the anticipated variations in operating conditions and circuit component values. This book covers the fundamentals of power electronics converter simulation, along with an analysis of power electronics converters using PLECS. It concludes with real-world simulation examples for applied content, making this book useful for all those in the electrical and electronic engineering field. Contains unique

examples on the simulation of power electronics converters using PLECS® Includes explanations and guidance on all included simulations for re-doing the simulations Incorporates analysis and design for rapidly creating power electronics circuits with high accuracy

Latest Advances in Electrothermal Models - Krzysztof Górecki 2021-03-17

This book is devoted to the latest advances in the area of electrothermal modelling of electronic components and networks. It contains eight sections by different teams of authors. These sections contain the results of: (a) electrothermal simulations of SiC power MOSFETs using a SPICE-like simulation program; (b) modelling thermal properties of inductors taking into account the influence of the core volume on the efficiency of heat removal; (c) investigations into the problem of inserting a temperature sensor in the neighbourhood of a chip to monitor its junction temperature; (d) computations of the internal temperature of power LEDs situated in

modules containing multiple-power LEDs, taking into account both self-heating in each power LED and mutual thermal couplings between each diode; (e) analyses of DC-DC converters using the electrothermal averaged model of the diode-transistor switch, including an IGBT and a rapid-switching diode; (f) electrothermal modelling of SiC power BJTs; (g) analysis of the efficiency of selected algorithms used for solving heat transfer problems at nanoscale; (h) analysis related to thermal simulation of the test structure dedicated to heat-diffusion investigation at the nanoscale.

Inductors and Transformers for Power Electronics - Vencislav Cekov Valchev
2018-10-03

Although they are some of the main components in the design of power electronic converters, the design of inductors and transformers is often still a trial-and-error process due to a long working-in time for these components. *Inductors and Transformers for Power Electronics* takes the guesswork out of the design and testing of these systems and provides a broad overview of all aspects of design. *Inductors and Transformers for Power Electronics* uses classical methods and numerical tools such as the finite element method to provide an overview of the basics and technological aspects of design. The authors present a fast approximation method useful in the early design as well as a more detailed analysis. They address design aspects such as the magnetic core and winding, eddy currents, insulation, thermal design, parasitic effects, and measurements. The text contains suggestions for improving designs in specific cases, models of thermal behavior with various levels of complexity, and several loss and thermal measurement techniques. This book offers in a single reference a concise representation of the large body of literature on the subject and supplies tools that designers desperately need to improve the accuracy and performance of their designs by eliminating trial-and-error.

Power Electronics Design - Keith H. Sueker
2011-04-01

This book serves as an invaluable reference to *Power Electronics Design*, covering the application of high-power semiconductor technology to large motor drives, power

supplies, power conversion equipment, electric utility auxiliaries and numerous other applications. Design engineers, design drafters and technicians in the power electronics industry, as well as students studying power electronics in various contexts, will benefit from Keith Sueker's decades of experience in the industry. With this experience, the author has put the overall power electronics design process in the context of primary electronic components and the many associated components required for a system. The seeming complexity of power electronics design is made transparent with Keith Sueker's simple, direct language and a minimum reliance on mathematics. Readers will come away with a wealth of practical design information that has hundreds of explanatory diagrams to support it, having also seen many examples of potential pitfalls in the design process. * A down-to-earth approach, free of complex jargon and esoteric information. * Over 200 illustrations to clarify discussion points. * Examples of costly design goofs will provide invaluable cautionary advice.

Power Electronics Handbook - Muhammad H. Rashid 2017-09-09

Power Electronics Handbook, Fourth Edition, brings together over 100 years of combined experience in the specialist areas of power engineering to offer a fully revised and updated expert guide to total power solutions. Designed to provide the best technical and most commercially viable solutions available, this handbook undertakes any or all aspects of a project requiring specialist design, installation, commissioning and maintenance services. Comprising a complete revision throughout and enhanced chapters on semiconductor diodes and transistors and thyristors, this volume includes renewable resource content useful for the new generation of engineering professionals. This market leading reference has new chapters covering electric traction theory and motors and wide band gap (WBG) materials and devices. With this book in hand, engineers will be able to execute design, analysis and evaluation of assigned projects using sound engineering principles and adhering to the business policies and product/program requirements. Includes a list of leading international academic and professional contributors Offers practical

concepts and developments for laboratory test plans Includes new technical chapters on electric vehicle charging and traction theory and motors Includes renewable resource content useful for the new generation of engineering professionals

Introduction to Electrical Power and Power Electronics - Mukund R. Patel 2012-12-10

Most traditional power systems textbooks focus on high-voltage transmission. However, the majority of power engineers work in urban factories, buildings, or industries where power comes from utility companies or is self-generated. *Introduction to Electrical Power and Power Electronics* is the first book of its kind to cover the entire scope of electrical power and power electronics systems in one volume—with a focus on topics that are directly relevant in power engineers' daily work. Learn How Electrical Power Is Generated, Distributed, and Utilized Composed of 17 chapters, the book is organized into two parts. The first part introduces aspects of electrical power that most power engineers are involved in during their careers, including the distribution of power to load equipment such as motors via step-down transformers, cables, circuit breakers, relays, and fuses. For engineers working with standalone power plants, it also tackles generators. The book discusses how to design and operate systems for economic use of power and covers the use of batteries in greater depth than typically found in traditional power system texts. *Understand How Power Electronics Work in Modern Systems* The second part delves into power electronics switches, as well as the DC-DC converters, AC-DC-AC converters, and frequency converters used in variable-frequency motor drives. It also discusses quality-of-power issues in modern power systems with many large power electronics loads. A chapter on power converter cooling presents important interdisciplinary design topics. Draw on the Author's Extensive Industry and Teaching Experience This timely book draws on the author's 30 years of work experience at General Electric, Lockheed Martin, and Westinghouse Electric and 15 years of teaching electrical power at the U.S. Merchant Marine Academy. Designed for a one-semester or two-quarter course in electrical power and power

electronics, it is also ideal for a refresher course or as a one-stop reference for industry professionals.

Introduction to Modern Power Electronics - Andrzej M. Trzynadlowski 2010-03-15

This updated edition of this book provides comprehensive coverage of modern power electronics, addressing all the latest trends and hot-button issues & mdash;from PWM rectifiers to renewable energy systems to electromagnetic interference. It features an overview of advanced control methods used in today & rsquo;s power electronic converters, numerous SPICE files of typical power conversion circuits, and an Instructor's Manual with solutions to all problems. An extensive body of examples, exercises, computer assignments, and simulations make ...

Spice for Power Electronics and Electric Power - Muhammad H. Rashid 2017-03-29

Power electronics can be a difficult course for students to understand and for professors to teach. Simplifying the process for both, *SPICE for Power Electronics and Electric Power, Third Edition* illustrates methods of integrating industry standard SPICE software for design verification and as a theoretical laboratory bench. Helpful PSpice Software and Program Files Available for Download Based on the author Muhammad H. Rashid's considerable experience merging design content and SPICE into a power electronics course, this vastly improved and updated edition focuses on helping readers integrate the SPICE simulator with a minimum amount of time and effort. Giving users a better understanding of the operation of a power electronics circuit, the author explores the transient behavior of current and voltage waveforms for each and every circuit element at every stage. The book also includes examples of all types of power converters, as well as circuits with linear and nonlinear inductors. New in this edition: Student learning outcomes (SLOs) listed at the start of each chapter Changes to run on OrCAD version 9.2 Added VPRINT1 and IPRINT1 commands and examples Notes that identify important concepts Examples illustrating EVALUATE, GVALUE, ETABLE, GTABLE, ELAPLACE, GLAPLACE, EFREQ, and GFREQ Mathematical relations for expected outcomes, where appropriate The

Fourier series of the output voltages for rectifiers and inverters PSpice simulations of DC link inverters and AC voltage controllers with PWM control This book demonstrates techniques of executing power conversions and ensuring the quality of the output waveforms rather than the accurate modeling of power semiconductor devices. This approach benefits students, enabling them to compare classroom results obtained with simple switch models of devices. In addition, a new chapter covers multi-level converters. Assuming no prior knowledge of SPICE or PSpice simulation, the text provides detailed step-by-step instructions on how to draw a schematic of a circuit, execute simulations, and view or plot the output results. It also includes suggestions for laboratory experiments and design problems that can be used for student homework assignments.

Power Electronics - M. H. Rashid 2004

For junior or senior undergraduate students in Electrical and Electronic Engineering. This text covers the basics of emerging areas in power electronics and a broad range of topics such as power switching devices, conversion methods, analysis and techniques, and applications.

Electrical Contacts - Milenko Braunovic 2017-12-19

Various factors affect the performance of electrical contacts, including tribological, mechanical, electrical, and materials aspects. Although these behaviors have been studied for many years, they are not widely used or understood in practice. Combining approaches used across the globe, *Electrical Contacts: Fundamentals, Applications, and Technology* integrates advances in research and development in the tribological, material, and analytical aspects of electrical contacts with new data on electrical current transfer at the micro- and nanoscales. Taking an application-oriented approach, the authors illustrate how material characteristics, tribological behavior, and loading impact the degradation of contacts, formation of intermetallics, and overall reliability and performance. Coverage is divided broadly into three sections, with the first focused on mechanics, tribology, materials, current and heat transfer, and basic reliability issues of electrical contacts. The next section explores applications, such as power

connections, electronic connections, and sliding contacts, while the final section presents the diagnostic and monitoring techniques used to investigate and measure phenomena occurring at electrical contact interfaces. Numerous references to current literature reflect the fact that this book is the most comprehensive survey in the field. Explore an impressive collection of data, theory, and practical applications in *Electrical Contacts: Fundamentals, Applications, and Technology*, a critical tool for anyone investigating or designing electrical equipment with improved performance and reliability in mind.

Power Electronic Converters - Narayanaswamy P R Iyer 2018-03-09

Provides a step-by-step method for the development of a virtual interactive power electronics laboratory. The book is suitable for undergraduates and graduates for their laboratory course and projects in power electronics. It is equally suitable for professional engineers in the power electronics industry. The reader will learn to develop interactive virtual power electronics laboratory and perform simulations of their own, as well as any given power electronic converter design using SIMULINK with advanced system model and circuit component level model. Features Examples and Case Studies included throughout. Introductory simulation of power electronic converters is performed using either PSIM or MICROCAP Software. Covers interactive system model developed for three phase Diode Clamped Three Level Inverter, Flying Capacitor Three Level Inverter, Five Level Cascaded H-Bridge Inverter, Multicarrier Sine Phase Shift PWM and Multicarrier Sine Level Shift PWM. System models of power electronic converters are verified for performance using interactive circuit component level models developed using Simscape-Electrical, Power Systems and Specialized Technology block set. Presents software in the loop or Processor in the loop simulation with a power electronic converter examples.

DC Power Supplies - Nihal Kularatna 2018-10-03

As we increasingly use electronic devices to direct our daily lives, so grows our dependence on reliable energy sources to power them. Because modern electronic systems demand

steady, efficient, reliable DC voltage sources—often at a sub-1V level—commercial AC lines, batteries, and other common resources no longer suffice. New technologies also require intricate techniques to protect against natural and manmade disasters. Still, despite its importance, practical information on this critical subject remains hard to find. Using simple, accessible language to balance coverage of theoretical and practical aspects, *DC Power Supplies, Power Management and Surge Protection* details the essentials of power electronics circuits applicable to low-power systems, including modern portable devices. A summary of underlying principles and essential design points, it compares academic research and industry publications and reviews DC power supply fundamentals, including linear and low-dropout regulators. Content also addresses common switching regulator topologies, exploring resonant conversion approaches. Coverage includes other important topics such as: Control aspects and control theory Digital control and control ICs used in switching regulators Power management and energy efficiency Overall power conversion stage and basic protection strategies for higher reliability Battery management and comparison of battery chemistries and charge/discharge management Surge and transient protection of circuits designed with modern semiconductors based on submicron dimension transistors This specialized design resource explores applicable fundamental elements of power sources, with numerous cited references and discussion of commercial components and manufacturers. Regardless of their previous experience level, this information will greatly aid designers, researchers, and academics who, study, design, and produce the viable new power sources needed to propel our modern electronic world. CRC Press Authors Speak Nihal Kularatna introduces his book. Watch the video *Inside OrCAD Capture for Windows* - Chris Schroeder 1998-08-24

Inside OrCAD Capture for Windows is a reference manual and tutorial for engineers and technicians who use OrCAD as an engineering design assistance (EDA) tool. This introduction to OrCAD is designed to give easy access to practical information. Important subjects, such

as export of schematic data for use in circuit analysis or PCB design, are expanded well beyond the information available in OrCAD's documentation. The command reference is a complete listing and explanation of the OrCAD commands and functions. A series of appendices provide important tips and techniques and information about linking OrCAD to other CAD/CAE tools used in the electronics design process. A utilities disk is included. Exercises at the end of each chapter make this book appropriate for academic use. The accompanying disk contains a parts library for the tutorial exercises and several useful utilities such as a bill of material sort, making this book a valuable tool for the design engineer or engineering student. Detailed tutorial OrCAD Capture for Windows is supported on Windows 3.1, 95, and NT Tips and techniques for design engineers

Electrotechnical Systems - Igor Korotyeyev
2018-10-03

Advances in mathematical methods, computer technology, and electrotechnical devices in particular continue to result in the creation of programs that are leading to increased labor productivity. Mathematical and simulation programs—and other programs that unite these two operations—provide the ability to calculate transitional, steady-state processes, stability conditions, and harmonic composition, and are often used to analyze processes in power electronic systems. *Electrotechnical Systems: Calculation and Analysis with Mathematica and PSpice* explores the potential of two such programs—Mathematica and ORCAD (PSpice)—as they are used for analysis in various areas. The authors discuss the formulation of problems and the steps in their solution. They focus on the analysis of transient, steady-state processes and their stability in non-stationary and nonlinear systems with DC and AC converters. All problems are solved using Mathematica, and program codes are presented. The authors use ORCAD (PSpice) to compare the results obtained by employing Mathematica and to demonstrate the peculiarities associated with its use. This book clearly and concisely illustrates represented expressions, variables, and functions and the general application of the mathematical pocket Mathematica 4.2 for the

analysis of the electromagnetic processes in electrotechnical systems. It will be a valuable addition to the library of anyone working with electrotechnical systems.

The Power Electronics Handbook - Timothy L. Skvarenina 2018-10-03

Less expensive, lighter, and smaller than its electromechanical counterparts, power electronics lie at the very heart of controlling and converting electric energy, which in turn lies at the heart of making that energy useful. From household appliances to space-faring vehicles, the applications of power electronics are virtually limitless. Until now, however, the same could not be said for access to up-to-date reference books devoted to power electronics. Written by engineers for engineers, The Power Electronics Handbook covers the full range of relevant topics, from basic principles to cutting-edge applications. Compiled from contributions by an international panel of experts and full of illustrations, this is not a theoretical tome, but a practical and enlightening presentation of the usefulness and variety of technologies that encompass the field. For modern and emerging applications, power electronic devices and systems must be small, efficient, lightweight, controllable, reliable, and economical. The Power Electronics Handbook is your key to understanding those devices, incorporating them into controllable circuits, and implementing those systems into applications from virtually every area of electrical engineering.

SPICE for Power Electronics and Electric Power, Third Edition - Muhammad H. Rashid
2012-05-24

Power electronics can be a difficult course for students to understand and for professors to teach. Simplifying the process for both, SPICE for Power Electronics and Electric Power, Third Edition illustrates methods of integrating industry standard SPICE software for design verification and as a theoretical laboratory bench. Helpful PSpice Software and Program Files Available for Download Based on the author Muhammad H. Rashid's considerable experience merging design content and SPICE into a power electronics course, this vastly improved and updated edition focuses on helping readers integrate the SPICE simulator with a minimum amount of time and effort.

Giving users a better understanding of the operation of a power electronics circuit, the author explores the transient behavior of current and voltage waveforms for each and every circuit element at every stage. The book also includes examples of all types of power converters, as well as circuits with linear and nonlinear inductors. New in this edition: Student learning outcomes (SLOs) listed at the start of each chapter Changes to run on OrCAD version 9.2 Added VPRINT1 and IPRINT1 commands and examples Notes that identify important concepts Examples illustrating EVALUATE, GVALUE, ETABLE, GTABLE, ELAPLACE, GLAPLACE, EFREQ, and GFREQ Mathematical relations for expected outcomes, where appropriate The Fourier series of the output voltages for rectifiers and inverters PSpice simulations of DC link inverters and AC voltage controllers with PWM control This book demonstrates techniques of executing power conversions and ensuring the quality of the output waveforms rather than the accurate modeling of power semiconductor devices. This approach benefits students, enabling them to compare classroom results obtained with simple switch models of devices. In addition, a new chapter covers multi-level converters. Assuming no prior knowledge of SPICE or PSpice simulation, the text provides detailed step-by-step instructions on how to draw a schematic of a circuit, execute simulations, and view or plot the output results. It also includes suggestions for laboratory experiments and design problems that can be used for student homework assignments.

Numerical Simulation - Mykhaylo Andriyчук
2012-09-19

Numerical Simulation - from Theory to Industry is the edited book containing 25 chapters and divided into four parts. Part 1 is devoted to the background and novel advances of numerical simulation; second part contains simulation applications in the macro- and micro-electrodynamics. Part 3 includes contributions related to fluid dynamics in the natural environment and scientific applications; the last, fourth part is dedicated to simulation in the industrial areas, such as power engineering, metallurgy and building. Recent numerical techniques, as well as software the most accurate and advanced in treating the physical

phenomena, are applied in order to explain the investigated processes in terms of numbers. Since the numerical simulation plays a key role in both theoretical and industrial research, this book related to simulation of many physical processes, will be useful for the pure research scientists, applied mathematicians, industrial engineers, and post-graduate students.

Introduction to Modern Power Electronics -
Andrzej M. Trzynadlowski 2015-10-19

Provides comprehensive coverage of the basic principles and methods of electric power conversion and the latest developments in the field This book constitutes a comprehensive overview of the modern power electronics. Various semiconductor power switches are described, complementary components and systems are presented, and power electronic converters that process power for a variety of applications are explained in detail. This third edition updates all chapters, including new concepts in modern power electronics. New to this edition is extended coverage of matrix converters, multilevel inverters, and applications of the Z-source in cascaded power converters. The book is accompanied by a website hosting an instructor's manual, a PowerPoint presentation, and a set of PSpice files for simulation of a variety of power electronic converters. Introduction to Modern Power Electronics, Third Edition: Discusses power conversion types: ac-to-dc, ac-to-ac, dc-to-dc, and dc-to-ac Reviews advanced control methods used in today's power electronic converters Includes an extensive body of examples, exercises, computer assignments, and simulations Introduction to Modern Power Electronics, Third Edition is written for undergraduate and graduate engineering students interested in modern power electronics and renewable energy systems. The book can also serve as a reference tool for practicing electrical and industrial engineers.

Pulse-Width Modulated DC-DC Power Converters - Marian K. Kazimierczuk
2015-10-26

PWM DC-DC power converter technology underpins many energy conversion systems including renewable energy circuits, active power factor correctors, battery chargers, portable devices and LED drivers. Following the

success of Pulse-Width Modulated DC-DC Power Converters this second edition has been thoroughly revised and expanded to cover the latest challenges and advances in the field. Key features of 2nd edition: Four new chapters, detailing the latest advances in power conversion, focus on: small-signal model and dynamic characteristics of the buck converter in continuous conduction mode; voltage-mode control of buck converter; small-signal model and characteristics of the boost converter in the discontinuous conduction mode and electromagnetic compatibility EMC. Provides readers with a solid understanding of the principles of operation, synthesis, analysis and design of PWM power converters and semiconductor power devices, including wide band-gap power devices (SiC and GaN). Fully revised Solutions for all end-of-chapter problems available to instructors via the book companion website. Step-by-step derivation of closed-form design equations with illustrations. Fully revised figures based on real data. With improved end-of-chapter summaries of key concepts, review questions, problems and answers, biographies and case studies, this is an essential textbook for graduate and senior undergraduate students in electrical engineering. Its superior readability and clarity of explanations also makes it a key reference for practicing engineers and research scientists.

Power Electronics - Issa Batarseh 2017-12-22
This fully updated textbook provides complete coverage of electrical circuits and introduces students to the field of energy conversion technologies, analysis and design. Chapters are designed to equip students with necessary background material in such topics as devices, switching circuit analysis techniques, converter types, and methods of conversion. The book contains a large number of examples, exercises, and problems to help enforce the material presented in each chapter. A detailed discussion of resonant and softswitching dc-to-dc converters is included along with the addition of new chapters covering digital control, non-linear control, and micro-inverters for power electronics applications. Designed for senior undergraduate and graduate electrical engineering students, this book provides students with the ability to analyze and design

power electronic circuits used in various industrial applications.

Power Electronics Handbook - Muhammad H. Rashid 2010-07-19

Power electronics, which is a rapidly growing area in terms of research and applications, uses modern electronics technology to convert electric power from one form to another, such as ac-dc, dc-dc, dc-ac, and ac-ac with a variable output magnitude and frequency. Power electronics has many applications in our every day life such as air-conditioners, electric cars, sub-way trains, motor drives, renewable energy sources and power supplies for computers. This book covers all aspects of switching devices, converter circuit topologies, control techniques, analytical methods and some examples of their applications. * 25% new content * Reorganized and revised into 8 sections comprising 43 chapters * Coverage of numerous applications, including uninterruptable power supplies and automotive electrical systems * New content in power generation and distribution, including solar power, fuel cells, wind turbines, and flexible transmission

Introduction to PSpice Using OrCAD for Circuits and Electronics - M. H. Rashid 2004

"This book uses a top-down approach to introduce readers to the SPICE simulator. It begins by describing techniques for simulating circuits, then presents the various SPICE and OrCAD commands and their applications to electrical and electronic circuits. Lavishly illustrated, this new edition includes even more hands-on exercises, suggestions, sample problems, and circuit models of actual devices. It is an ideal supplement for courses in electric or electronic circuitry and is also a solid professional reference."--BOOK JACKET. Title Summary field provided by Blackwell North America, Inc. All Rights Reserved

Electrical Power Transmission and Distribution - Bella H. Chudnovsky 2017-12-19
Electrical distribution and transmission systems are complex combinations of various conductive and insulating materials. When exposed to atmospheric corrosive gases, contaminants, extreme temperatures, vibrations, and other internal and external impacts, these systems deteriorate, and sooner or later their ability to function properly is destroyed. Electrical Power

Transmission and Distribution: Aging and Life Extension Techniques offers practical guidance on ways to slow down the aging of these electrical systems, improve their performance, and extend their life. Recognize the Signs of Aging in Equipment—and Learn How to Slow It A reference manual for engineering, maintenance, and training personnel, this book analyzes the factors that cause materials to deteriorate and explains what you can do to reduce the impact of these factors. In one volume, it brings together extensive information previously scattered among manufacturers' documentation, journal papers, conference proceedings, and general books on plating, lubrication, insulation, and other areas. Shows you how to identify the signs of equipment aging Helps you understand the causes of equipment deterioration Suggests practical techniques for protecting electrical apparatus from deterioration and damage Supplies information that can be used to develop manuals on proper maintenance procedures and choice of materials Provides numerous examples from industry This book combines research and engineering material with maintenance recommendations given in layperson's terms, making it useful for readers from a range of backgrounds. In particular, it is a valuable resource for personnel responsible for the utilization, operation, and maintenance of electrical transmission and distribution equipment at power plants and industrial facilities.

Integrated Power Electronic Converters and Digital Control - Ali Emadi 2017-12-19

Because of the demand for higher efficiencies, smaller output ripple, and smaller converter size for modern power electronic systems, integrated power electronic converters could soon replace conventional switched-mode power supplies. Synthesized integrated converters and related digital control techniques address problems related to cost, space, flexibility, energy efficiency, and voltage regulation—the key factors in digital power management and implementation. Meeting the needs of professionals working in power electronics, as well as advanced engineering students, *Integrated Power Electronic Converters and Digital Control* explores the many benefits associated with integrated converters. This

informative text details boost type, buck type, and buck-boost type integrated topologies, as well as other integrated structures. It discusses concepts behind their operation as well specific applications. Topics discussed include: Isolated DC-DC converters such as flyback, forward, push-pull, full-bridge, and half-bridge Power factor correction and its application Definition of the integrated switched-mode power supplies Steady-state analysis of the boost integrated flyback rectifier energy storage converter Dynamic analysis of the buck integrated forward converter Digital control based on the use of digital signal processors (DSPs) With innovations in digital control becoming ever more pervasive, system designers continue to introduce products that integrate digital power management and control integrated circuit solutions, both hybrid and pure digital. This detailed assessment of the latest advances in the field will help anyone working in power electronics and related industries stay ahead of the curve.

Switch-Mode Power Supplies Spice Simulations and Practical Designs -

Christophe Basso 2008-02-06

Harness Powerful SPICE Simulation and Design Tools to Develop Cutting-Edge Switch-Mode Power Supplies Switch-Mode Power Supplies: SPICE Simulations and Practical Designs is a comprehensive resource on using SPICE as a power conversion design companion. This book uniquely bridges analysis and market reality to teach the development and marketing of state-of-the-art switching converters. Invaluable to both the graduating student and the experienced design engineer, this guide explains how to derive founding equations of the most popular converters...design safe, reliable converters through numerous practical examples...and utilize SPICE simulations to virtually breadboard a converter on the PC before using the soldering iron. Filled with more than 600 illustrations, Switch-Mode Power Supplies: SPICE Simulations and Practical Designs enables you to: Derive founding equations of popular converters Understand and implement loop control via the book-exclusive small-signal models Design safe, reliable converters through practical examples Use SPICE simulations to virtually breadboard a converter on the PC Access design spreadsheets and simulation

templates on the accompanying CD-ROM, with numerous examples running on OrCAD[®], ICAPSE[®], μ Cap[®], TINA[®], and more Inside This Powerful SPICE Simulation and Design Resource

- Introduction to Power Conversion
- Small-Signal Modeling
- Feedback and Control Loops
- Basic Blocks and Generic Models
- Simulation and Design of Nonisolated Converters
- Simulation and Design of Isolated Converters-Front-End Rectification and Power Factor Correction
- Simulation and Design of Isolated Converters-The Flyback
- Simulation and Design of Isolated Converters-The Forward

SPICE for Power Electronics and Electric Power - M. H. Rashid 1993

Shows how to use SPICE for power electronics, and electric power for design verification and a theoretical laboratory bench. As well as allowing hands-on computer experience, this book also includes examples of circuits with linear and non-linear inductors, and all types of power converters.

Power Quality in Power Systems and Electrical Machines - Ewald Fuchs 2015-07-14

The second edition of this must-have reference covers power quality issues in four parts, including new discussions related to renewable energy systems. The first part of the book provides background on causes, effects, standards, and measurements of power quality and harmonics. Once the basics are established the authors move on to harmonic modeling of power systems, including components and apparatus (electric machines). The final part of the book is devoted to power quality mitigation approaches and devices, and the fourth part extends the analysis to power quality solutions for renewable energy systems. Throughout the book worked examples and exercises provide practical applications, and tables, charts, and graphs offer useful data for the modeling and analysis of power quality issues. Provides theoretical and practical insight into power quality problems of electric machines and systems 134 practical application (example) problems with solutions 125 problems at the end of chapters dealing with practical applications 924 references, mostly journal articles and conference papers, as well as national and international standards and guidelines

Modern Electrical Drives - H. Bülent Ertan

2013-06-29

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.

Control Circuits in Power Electronics - Miguel Castilla 2016-05-16

Resource added for the Electronics/Biomedical Technology program 106051.

Power Electronics and Motor Drive Systems - Stefanos Manias 2016-11-08

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

Power Electronic Control in Electrical Systems - Enrique Acha 2002-01-08

*A practical guide to the control of reactive power systems *Ideal for postgraduate and professional courses *Covers the latest equipment and computer-aided analysis A definitive new guide to the control of active and reactive power, featuring the latest developments including FACTS Power Electronic Control in Electrical Systems offers a solid theoretical foundation for the electronic control of active and reactive power, providing an overview of the composition of electrical power networks; a basic description of the most popular power systems studies; and coverage of the roles of Flexible Alternating Current Transmission Systems (FACTS) and Custom Power equipment. Developments in power electronics have opened up new ways in which power control may be achieved not only in high-voltage transmission systems but also in low-voltage distribution systems, and the coverage of these developments makes this new book on active and reactive power control in electrical power systems essential reading for advanced students, engineers and academics alike. Within this book the fundamental concepts associated with the topic of power electronic control are covered alongside the latest equipment and devices, new application areas and associated computer-assisted methods.

Low-Power CMOS Circuits - Christian Piguet 2018-10-03

The power consumption of microprocessors is one of the most important challenges of high-performance chips and portable devices. In chapters drawn from Piguet's recently published Low-Power Electronics Design, Low-Power CMOS Circuits: Technology, Logic Design, and CAD Tools addresses the design of low-power circuitry in deep submicron technologies. It

provides a focused reference for specialists involved in designing low-power circuitry, from transistors to logic gates. The book is organized into three broad sections for convenient access. The first examines the history of low-power electronics along with a look at emerging and possible future technologies. It also considers other technologies, such as nanotechnologies and optical chips, that may be useful in designing integrated circuits. The second part explains the techniques used to reduce power consumption at low levels. These include clock gating, leakage reduction, interconnecting and communication on chips, and adiabatic circuits. The final section discusses various CAD tools for designing low-power circuits. This section includes three chapters that demonstrate the tools and low-power design issues at three major companies that produce logic synthesizers. Providing detailed examinations contributed by leading experts, *Low-Power CMOS Circuits: Technology, Logic Design, and CAD Tools* supplies authoritative information on how to design and model for high performance with low power consumption in modern integrated circuits. It is a must-read for anyone designing modern computers or embedded systems.

The Art of Simulation Using PSpice Analog and Digital - Bashir Al-Hashimi 2019-12-06

This comprehensive volume covers both elementary and advanced analog and digital circuit simulation using PSpice. The text includes many worked examples, circuit diagrams, tables, and code listings. It also compares practical results with those obtained from simulation.

PSpice and MATLAB for Electronics - John Okyere Attia 2010-06-23

Used collectively, PSpice and MATLAB are unsurpassed for circuit modeling and data analysis. PSpice can perform DC, AC, transient, Fourier, temperature, and Monte Carlo analysis of electronic circuits with device models and subsystem subcircuits. MATLAB can then carry out calculations of device parameters, curve fitting, numerical integration, numerical

Power Electronics - Ned Mohan 1995

Power Conversion of Renewable Energy Systems - Ewald F. Fuchs 2011-03-31

Power Conversion of Renewable Energy Systems

presents an introduction to conventional energy conversion components and systems, as well as those related to renewable energy. This volume introduces systems first, and then in subsequent chapters describes the components of energy systems in detail. Readers will find examples of renewable and conventional energy and power systems, including energy conversion, variable-speed drives and power electronics, in addition to magnetic devices such as transformers and rotating machines. Applications of PSpice, MATLAB, and Mathematica are also included, along with solutions to over 100 application examples. *Power Conversion of Renewable Energy Systems* aims to instruct readers how to actively apply the theories discussed within. It would be an ideal volume for researchers, students and engineers working with energy systems and renewable energy.

SPICE for Power Electronics and Electric Power - Muhammad H. Rashid 2017-12-19

Power electronics can be a difficult course for students to understand and for professors to teach. Simplifying the process for both, *SPICE for Power Electronics and Electric Power, Third Edition* illustrates methods of integrating industry standard SPICE software for design verification and as a theoretical laboratory bench. Helpful PSpice Software and Program Files Available for Download Based on the author Muhammad H. Rashid's considerable experience merging design content and SPICE into a power electronics course, this vastly improved and updated edition focuses on helping readers integrate the SPICE simulator with a minimum amount of time and effort. Giving users a better understanding of the operation of a power electronics circuit, the author explores the transient behavior of current and voltage waveforms for each and every circuit element at every stage. The book also includes examples of all types of power converters, as well as circuits with linear and nonlinear inductors. New in this edition: Student learning outcomes (SLOs) listed at the start of each chapter Changes to run on OrCAD version 9.2 Added VPRINT1 and IPRINT1 commands and examples Notes that identify important concepts Examples illustrating EVALUATE, GVALUE, ETABLE, GTABLE, ELAPLACE, GLAPLACE, EFREQ, and GFREQ Mathematical relations for

expected outcomes, where appropriate The Fourier series of the output voltages for rectifiers and inverters PSpice simulations of DC link inverters and AC voltage controllers with PWM control This book demonstrates techniques of executing power conversions and ensuring the quality of the output waveforms rather than the accurate modeling of power semiconductor devices. This approach benefits students, enabling them to compare classroom results obtained with simple switch models of devices. In addition, a new chapter covers multi-level converters. Assuming no prior knowledge of SPICE or PSpice simulation, the text provides detailed step-by-step instructions on how to draw a schematic of a circuit, execute simulations, and view or plot the output results. It also includes suggestions for laboratory experiments and design problems that can be used for student homework assignments.

Transformers and Inductors for Power Electronics - W.G. Hurley 2013-02-21

Based on the fundamentals of electromagnetics, this clear and concise text explains basic and applied principles of transformer and inductor design for power electronic applications. It details both the theory and practice of inductors and transformers employed to filter currents, store electromagnetic energy, provide physical isolation between circuits, and perform stepping up and down of DC and AC voltages. The authors present a broad range of applications from modern power conversion systems. They provide rigorous design guidelines based on a robust methodology for inductor and transformer design. They offer real design examples, informed by proven and working field examples. Key features include: emphasis on high frequency design, including optimisation of the winding layout and treatment of non-sinusoidal waveforms a chapter on planar magnetic with analytical models and descriptions of the processing technologies analysis of the role of variable inductors, and their applications for power factor correction and solar power unique coverage on the measurements of inductance and transformer capacitance, as well as tests for core losses at high frequency worked examples in MATLAB, end-of-chapter problems, and an accompanying website containing solutions, a full set of instructors' presentations, and copies

of all the figures. Covering the basics of the magnetic components of power electronic converters, this book is a comprehensive reference for students and professional engineers dealing with specialised inductor and transformer design. It is especially useful for senior undergraduate and graduate students in electrical engineering and electrical energy systems, and engineers working with power supplies and energy conversion systems who want to update their knowledge on a field that has progressed considerably in recent years.

Design and Control of Power Converters 2020 - Manuel Arias 2021-06-04

In this book, nine papers focusing on different fields of power electronics are gathered, all of which are in line with the present trends in research and industry. Given the generality of the Special Issue, the covered topics range from electrothermal models and losses models in semiconductors and magnetics to converters used in high-power applications. In this last case, the papers address specific problems such as the distortion due to zero-current detection or fault investigation using the fast Fourier transform, all being focused on analyzing the topologies of high-power high-density applications, such as the dual active bridge or the H-bridge multilevel inverter. All the papers provide enough insight in the analyzed issues to be used as the starting point of any research. Experimental or simulation results are presented to validate and help with the understanding of the proposed ideas. To summarize, this book will help the reader to solve specific problems in industrial equipment or to increase their knowledge in specific fields.

Artificial Intelligent Techniques for Electric and Hybrid Electric Vehicles - Chitra A. 2020-07-10

Electric vehicles/hybrid electric vehicles (EV/HEV) commercialization is still a challenge in industries in terms of performance and cost. The performance along with cost reduction are two tradeoffs which need to be researched to arrive at an optimal solution. This book focuses on the convergence of various technologies involved in EV/HEV. The book brings together the research that is being carried out in the field of EV/HEV whose leading role is by optimization techniques with artificial intelligence (AI). Other

featured research includes green drive schemes which involve the possible renewable energy sources integration to develop eco-friendly green vehicles, as well as Internet of Things (IoT)-based techniques for EV/HEVs. Electric vehicle research involves multi-disciplinary expertise from electrical, electronics, mechanical

engineering and computer science. Consequently, this book serves as a point of convergence wherein all these domains are addressed and merged and will serve as a potential resource for industrialists and researchers working in the domain of electric vehicles.