electrical drives and control by bakshi

#electrical drives #control systems engineering #power electronics drives #motor control theory #Bakshi electrical engineering

Discover a comprehensive understanding of electrical drives and control systems engineering through this essential resource. Authored by Bakshi, this content rigorously explores the principles behind various power electronics drives and advanced motor control theory, making it invaluable for students, educators, and professionals seeking expertise in this critical field of electrical engineering.

Modern DC-to-DC Switchmode Power Converter Circuits

As each area of technology with a potential for significantly impacting any major segment of the electronics industry evolves, it often is accompanied by the development of a succession of new circuits. Each new circuit indeed appears different, employing different components in differing configurations, and claims an assortment of distinct features of "improved performance. " Without a considerable investment of laboratory time to construct, evaluate, and compare each candidate circuit, it usually is difficult to realistically appraise the relative merits of one approach over another. It often is even more difficult to identify the underlying principles which point up basic similarities and differences. Such is the situation in the new and rapidly expanding area known as electronic power processing or switching mode power supplies. The area of switching power supplies has been spurred by the need for power sources of higher performance, smaller volume, and lighter weight in order to achieve compatibility with the shrinking size of all forms of communication and data handling systems, and particularly with the portable battery-operated equipment in everything from horne appliances and handtools to mobile com munication equipment. Static dc-to-dc converters and dc-to-ac inverters provide a natural interface with the new direct energy sources such as solar cells, fuel cells, thermoelectric generators, and the like, and form the central ingredient in most uninterruptable power sources.

Power Electronics and Motor Drives

The Industrial Electronics Handbook, Second Edition combines traditional and newer, more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high-power applications. Embracing the broad technological scope of the field, this collection explores fundamental areas, including analog and digital circuits, electronics, electromagnet-ic machines, signal processing, and industrial control and communications systems. It also facilitates the use of intelligent systems—such as neural networks, fuzzy systems, and evolutionary methods—in

terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components. Enhancing its value, this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal, one of the largest and most respected publications in the field. Power Electronics and Motor Drives facilitates a necessary shift from low-power electronics to the high-power varieties used to control electromechanical systems and other industrial applications. This volume of the handbook: Focuses on special high-power semiconductor devices Describes various electrical machines and motors, their principles of operation, and their limitations Covers power conversion and the high-efficiency devices that perform the necessary switchover between AC and DC Explores very specialized electronic circuits for the efficient control of electric motors Details other applications of power electronics, aside from electric motors—including lighting, renewable energy conversion, and automotive electronics Addresses power electronics used in very-high-power electrical systems to transmit energy Other volumes in the set: Fundamentals of Industrial Electronics Control and Mechatronics Industrial Communication Systems Intelligent Systems

The Industrial Electronics Handbook - Five Volume Set

Industrial electronics systems govern so many different functions that vary in complexity-from the operation of relatively simple applications, such as electric motors, to that of more complicated machines and systems, including robots and entire fabrication processes. The Industrial Electronics Handbook, Second Edition combines traditional and new

Semiconductor Power Electronics

Semiconductors have been used widely in signal-level or "brain" applications. Since their invention in 1948, transistors have revolutionized the electronics industry in computers, information processing, and communications. Now, however, semiconductors are being used more and more where consid erable "brawn" is required. Devices such as high-power bipolar junction tran sistors and power field-effect transistors, as well as SCRs, TRIACs, GTOs, and other semiconductor switching devices that use a p-n-p-n regenerative effect to achieve bistable action, are expanding the power-handling horizons of semicon ductors and finding increasing application in a wide range of products including regulated power supplies, lamp dimmers, motor drives, pulse modulators, and heat controls. HVDC and electric-vehicle propulsion are two additional areas of application which may have a very significant long range impact on the tech nology. The impact of solid-state devices capable of handling appreciable power levels has yet to be fully realized. Since it first became available in late 1957, the SCR or silicon-controlled rec tifier (also called the reverse blocking triode thyristor) has become the most popular member of the thyristor family. At present, SCRs are available from a large number of manufacturers in this country and abroad. SCR ratings range from less than one ampere to over three thousand amperes with voltage ratings in excess of three thousand volts.

Random Signals Estimation and Identification

The techniques used for the extraction of information from received or ob served signals are applicable in many diverse areas such as radar, sonar, communications, geophysics, remote sensing, acoustics, meteorology, med ical imaging systems, and electronics warfare. The received signal is usually disturbed by thermal, electrical, atmospheric, channel, or intentional inter ferences. The received signal cannot be predicted deterministically, so that statistical methods are needed to describe the signal. In general, therefore, any received signal is analyzed as a random signal or process. The purpose of this book is to provide an elementary introduction to random signal analysis, estimation, filtering, and identification. The emphasis of the book is on the computational aspects as well as presentation of com mon analytical tools for systems involving random signals. The book covers random processes, stationary signals, spectral analysis, estimation, optimiz ation, detection, spectrum estimation, prediction, filtering, and identification. The book is addressed to practicing engineers and scientists. It can be used as a text for courses in the areas of random processes, estimation theory, and system identification by undergraduates and graduate students in engineer ing and science with some background in probability and linear algebra. Part of the book has been used by the author while teaching at State University of New York at Buffalo and California State University at Long Beach. Some of the algorithms presented in this book have been successfully applied to industrial projects.

Signal Processing

Signal processing arises in the design of such diverse systems as communications, sonar, radar, electrooptical, navigation, electronic warfare and medical imaging systems. It is also used in many physical sciences, such as geophysics, acoustics, and meteorology, among many others. The common theme is to extract and estimate the desired signals, which are mixed with a variety of noise sources and disturbances. Signal processing involves system analysis, random processes, statistical inferences, and software and hardware implementation. The purpose of this book is to provide an elementary, informal introduction, as well as a comprehensive account of principles of random signal processing, with emphasis on the computational aspects. This book covers linear system analysis, probability theory, random signals, spectral analysis, estimation, filtering, and detection theory. It can be used as a text for a course in signal processing by under graduates and beginning graduate students in engineering and science and also by engineers and scientists engaged in signal analysis, filtering, and detection. Part of the book has been used by the author while teaching at the State University of New York at Buffalo and California State University at Long Beach. An attempt has been made to make the book self-contained and straight forward, with the hope that readers with varied backgrounds can appreciate and apply principles of signal processing. Chapter 1 provides a brief review of linear analysis of deterministic signals.

Time-Domain Measurements in Electromagnetics

From traditional topics that form the core of industrial electronics, to new and emerging concepts and technologies, The Industrial Electronics Handbook, in a single volume, has the field covered. Nowhere else will you find so much information on so many major topics in the field. For facts you need every day, and for discussions on topics you have only dreamed of, The Industrial Electronics Handbook is an ideal reference.

The Industrial Electronics Handbook

Power Management Integrated Circuits and Technologies delivers a modern treatise on mixed-signal integrated circuit design for power management. Comprised of chapters authored by leading researchers from industry and academia, this definitive text: Describes circuit- and architectural-level innovations that meet advanced power and speed capabilities Explores hybrid inductive-capacitive converters for wide-range dynamic voltage scaling Presents innovative control techniques for single inductor dual output (SIDO) and single inductor multiple output (SIMO) converters Discusses cutting-edge design techniques including switching converters for analog/RF loads Compares the use of GaAs pHEMTs to CMOS devices for efficient high-frequency switching converters Thus, Power Management Integrated Circuits and Technologies provides comprehensive, state-of-the-art coverage of this exciting and emerging field of engineering.

Power Management Integrated Circuits

The increased efficiency and quality constraints imposed on electrical energy systems have inspired a renewed research interest in the study of formal approaches to the analysis and control of power electronics converters. Switched systems represent a useful framework for modeling these converters and the peculiarities of their operating conditions and control goals justify the specific classification of “switched electronic systems”. Indeed, idealized switched models of power converters introduce problems not commonly encountered when analyzing generic switched models or non-switched electrical networks. In that sense the analysis of switched electronic systems represents a source for new ideas and benchmarks for switched and hybrid systems generally. Dynamics and Control of Switched Electronic Systems draws on the expertise of an international group of expert contributors to give an overview of recent advances in the modeling, simulation and control of switched electronic systems. The reader is provided with a well-organized source of references and a mathematically-based report of the state of the art in analysis and design techniques for switched power converters. Intuitive language, realistic illustrative examples and numerical simulations help the reader to come to grips with the rigorous presentation of many promising directions of research such as: converter topologies and modulation techniques; continuous-time, discrete-time and hybrid models; modern control strategies for power converters; and challenges in numerical simulation. The guidance and information imparted in this text will be appreciated by engineers, and applied mathematicians working on system and circuit theory, control systems development, and electronic and energy conversion systems design.

Books in Series, 1876-1949

Since its invention in 1962, the semiconductor laser has come a long way. Advances in material purity and epitaxial growth techniques have led to a variety of semiconductor lasers covering a wide wavelength range of 0. 3- 100 ILm. The development during the 1970s of GaAs semiconductor lasers, emitting in the near-infrared region of 0. 8--0. 9 ILm, resulted in their use for the first generation of optical fiber communication systems. However, to take advantage of low losses in silica fibers occurring around 1. 3 and 1. 55 ILm, the emphasis soon shifted toward long-wavelength semiconductor lasers. The material system of choice in this wavelength range has been the quaternary alloy InGaAsP. During the last five years or so, the intense development effort devoted to InGaAsP lasers has resulted in a technology mature enough that lightwave transmission systems using InGaAsP lasers are currently being deployed throughout the world. This book is intended to provide a comprehensive account of long-wave length semiconductor lasers. Particular attention is paid to InGaAsP lasers, although we also consider semiconductor lasers operating at longer wave lengths. The objective is to provide an up-to-date understanding of semicon ductor lasers while incorporating recent research results that are not yet available in the book form. Although InGaAsP lasers are often used as an example, the basic concepts discussed in this text apply to all semiconductor lasers, irrespective of their wavelengths.

Dynamics and Control of Switched Electronic Systems

DC-DC converters have many applications in the modern world. They provide the required power to the communication backbones, they are used in digital devices like laptops and cell phones, and they have widespread applications in electric cars, to just name a few. DC-DC converters require negative feedback to provide a suitable output voltage or current for the load. Obtaining a stable output voltage or current in presence of disturbances such as: input voltage changes and/or output load changes seems impossible without some form of control. This book tries to train the art of controller design for DC-DC converters. Chapter 1 introduces the DC-DC converters briefly. It is assumed that the reader has the basic knowledge of DC-DC converter (i.e., a basic course in power electronics). The reader learns the disadvantages of open loop control in Chapter 2. Simulation of DC-DC converters with the aid of Simulink® is discussed in this chapter as well. Extracting the dynamic models of DC-DC converters is studied in Chapter 3. We show how MATLAB® and a software named KUCA can be used to do the cumbersome and error-prone process of modeling automatically. Obtaining the transfer functions using PSIM® is studied as well. These days, softwares are an integral part of engineering sciences. Control engineering is not an exception by any means. Keeping this in mind, we design the controllers using MATLAB® in Chapter 4. Finally, references are provided at the end of each chapter to suggest more information for an interested reader. The intended audiences for this book are practice engineers and academians.

The British Library General Catalogue of Printed Books, 1986 to 1987

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.

Long-Wavelength Semiconductor Lasers

The most critical part of the modern switching-mode power supply is the regulated dc/dc converter. Its dynamic behavior directly determines or influences four of the important characteristics of the power supply: • Stability of the feedback loop • Rejection of input-voltage ripple and the closely-related

transient re sponse to input-voltage perturbation • Output impedance and the closely-related transient response to load perturbation • Compatibility with the input EMI filter Due to the complexity of the operation of the converter, predicting its dynamic behavior has not been easy. Without accurate prediction, and depending only on building the circuit and tinkering with it until the operation is satisfactory, the engineering cost can easily escalate and schedules can be missed. The situation is not much better when the circuit is built in the computer, using a general-purpose circuit-simulation program such as SPICE. (At the end of this book is a form for obtaining information on a computer program especially well suited for dynamic analysis of switching-mode power converters: DYANA, an acronym for "DYnamic ANAlysis. " DYANA is based on the method given in this book.) The main goal of this book is to help the power-supply designer in the prediction of the dynamic behavior by providing user-friendly analytical tools, concrete results of already-made analyses, tabulated for easy application by the reader, and examples of how to apply the tools provided in the book.

Conference Record of the 1990 IEEE Industry Applications Society Annual Meeting

AVERAGE CURRENT-MODE CONTROL OF DC-DC POWER CONVERTERS An authoritative one-stop guide to the analysis, design, development, and control of a variety of power converter systems Average Current-Mode Control of DC-DC Power Converters provides comprehensive and up-to-date information about average current-mode control (ACMC) of pulse-width modulated (PWM) dc-dc converters. This invaluable one-stop resource covers both fundamental and state-of-the-art techniques in average current-mode control of power electronic converters???featuring novel small-signal models of non-isolated and isolated converter topologies with joint and disjoint switching elements and coverage of frequency and time domain analysis of controlled circuits. The authors employ a systematic theoretical framework supported by step-by-step derivations, design procedures for measuring transfer functions, challenging end-of-chapter problems, easy-to-follow diagrams and illustrations, numerous examples for different power supply specifications, and practical tips for developing power-stage small-signal models using circuit-averaging techniques. The text addresses all essential aspects of modeling, design, analysis, and simulation of average current-mode control of power converter topologies, such as buck, boost, buck-boost, and flyback converters in operating continuous-conduction mode (CCM). Bridging the gap between fundamental modeling methods and their application in a variety of switched-mode power supplies, this book: Discusses the development of small-signal models and transfer functions related to the inner current and outer voltage loops Analyzes inner current loops with average current-mode control and describes their dynamic characteristics Presents dynamic properties of the poles and zeros, time-domain responses of the control circuits, and comparison of relevant modeling techniques Contains a detailed chapter on the analysis and design of control circuits in time-domain and frequency-domain Provides techniques required to produce professional MATLAB plots and schematics for circuit simulations, including example MATLAB codes for the complete design of PWM buck, boost, buck-boost, and flyback DC-DC converters Includes appendices with design equations for steady-state operation in CCM for power converters, parameters of commonly used power MOSFETs and diodes, SPICE models of selected MOSFETs and diodes, simulation tools including introductions to SPICE, MATLAB, and SABER, and MATLAB codes for transfer functions and transient responses Average Current-Mode Control of DC-DC Power Converters is a must-have reference and guide for researchers, advanced graduate students, and instructors in the area of power electronics, and for practicing engineers and scientists specializing in advanced circuit modeling methods for various converters at different operating conditions.

Dynamics and Control of DC-DC Converters

This book covers power electronics, in depth, by presenting the basic principles and application details, which can be used both as a textbook and reference book. Introduces a new method to present power electronics converters called Power Blocks Geometry (PBG) Applicable for courses focusing on power electronics, power electronics converters, and advanced power converters Offers a comprehensive set of simulation results to help understand the circuits presented throughout the book

Pulse-Width Modulated DC-DC Power Converters

Power Electronics and Energy Conversion Systems is adefinitive five-volume reference spanning classical theory throughpractical applications and consolidating the latest advancements inenergy conversion technology. Comprehensive yet highly accessible,each volume is organised in a basic-to-sophisticated crescendo,providing a single-source reference for undergraduate and graduatestu-

dents, researchers and designers. Volume 1 Fundamentals and Hard-switching Converters introduces thekey challenges in power electronics from basic components tooperation principles and presents classical hard- andsoft-switching DC to DC converters, rectifiers and inverters. At amore advanced level, it provides comprehensive analysis of DC andAC models comparing the available approaches for their derivationand results. A full treatment of DC to DC hard-switching convertersis given, from fundamentals to modern industrial solutions andpractical engineering insight. The author elucidates variouscontradictions and misunderstandings in the literature, forexample, in the treatment of the discontinuous conduction operationor in deriving AC small-signal models of converters. Other key features: • Consolidates the latest advancements in hard-switchingconverters including discontinuous capacitor voltage mode, andtheir use in power-factor-correction applications • Includes fully worked design examples, exercises, and casestudies, with discussion of the practical consequences of eachchoice made during the design • Explains all topics in detail with step-by-step derivationof formulas appropriate for energy conversion courses • End-of-section review of the learned material • Includes topics treated in recent journal, conference andindustry application coverage on solutions, theory and practicalconcerns With emphasis on clear explanation, the text offers both athorough understanding of DC to DC converters for undergraduate andgraduate students in power electronics, and more detailed materialsuitable for researchers, designers and practising engineersworking on the development and design of power electronics. This isan accessible reference for engineering and procurement managersfrom industries such as consumer electronics, integrated circuits,aerospace and renewable energy.

Dynamic Analysis of Switching-Mode DC/DC Converters

Computers play an important role in the analyzing and designing of modern DC-DC power converters. This book shows how the widely used analysis techniques of averaging and linearization can be applied to DC-DC converters with the aid of computers. Obtained dynamical equations may then be used for control design. The book is composed of two chapters. Chapter 1 focuses on the extraction of control-to-output transfer function. A second-order converter (a buck converter) and a fourth-order converter (a Zeta converter) are studied as illustrative examples in this chapter. Both ready-to-use software packages, such as PLECS(R) and MATLAB(R) programming, are used throught this chapter. The input/output characteristics of DC-DC converters are the object of considerations in Chapter 2. Calculation of input/output impedance is done with the aid of MATLAB(R) programming in this chapter. The buck, buck-boost, and boost converter are the most popular types of DC-DC converters and used as illustrative examples in this chapter. This book can be a good reference for researchers involved in DC-DC converters dynamics and control.

Average Current-Mode Control of DC-DC Power Converters

Power Electronics and Energy Conversion Systems is a definitive five-volume reference spanning classical theory through practical applications and consolidating the latest advancements in energy conversion technology. Comprehensive yet highly accessible, each volume is organised in a basic-to-sophisticated crescendo, providing a single-source reference for undergraduate and graduate students, researchers and designers. Volume 1 Fundamentals and Hard-switching Converters introduces the key challenges in power electronics from basic components to operation principles and presents classical hard- and soft-switching DC to DC converters, rectifiers and inverters. At a more advanced level, it provides comprehensive analysis of DC and AC models comparing the available approaches for their derivation and results. A full treatment of DC to DC hard-switching converters is given, from fundamentals to modern industrial solutions and practical engineering insight. The author elucidates various contradictions and misunderstandings in the literature, for example, in the treatment of the discontinuous conduction operation or in deriving AC small-signal models of converters. Other key features: • Consolidates the latest advancements in hard-switching converters including discontinuous capacitor voltage mode, and their use in power-factor-correction applications • Includes fully worked design examples, exercises, and case studies, with discussion of the practical consequences of each choice made during the design • Explains all topics in detail with step-by-step derivation of formulas appropriate for energy conversion courses • End-of-section review of the learned material • Includes topics treated in recent journal, conference and industry application coverage on solutions, theory and practical concerns With emphasis on clear explanation, the text offers both a thorough understanding of DC to DC converters for undergraduate and graduate students in power electronics, and more detailed material suitable for researchers, designers and practising engineers working on the development and

design of power electronics. This is an accessible reference for engineering and procurement managers from industries such as consumer electronics, integrated circuits, aerospace and renewable energy.

Advanced Power Electronics Converters

DC-DC converters require negative feedback to provide a suitable output voltage or current for the load. Obtaining a stable output voltage or current in the presence of disturbances like input voltage changes and/or output load changes seems impossible without some form of control. This book shows how simple controllers such as Proportional-Integral (PI) can turn into a robust controller by correct selection of its parameters. Kharitonov's theorem is an important tool toward this end. This book consist of two parts. The first part shows how one can obtain the interval plant model of a DC-DC converter. The second part introduces the Kharitonov's theorem. Kharitonov's theorem is an analysis tool rather than a design tool. Some case studies show how it can be used as a design tool. The prerequisite for reading this book is a first course on feedback control theory and power electronics.

Power Electronics and Energy Conversion Systems, Fundamentals and Hard-switching Converters

Power converters are at the heart of modern power electronics. From automotive power systems to propulsion for large ships, their use permeates through industrial, commercial, military, and aerospace applications of various scales. Having reached a point of saturation where we are unlikely to see many new and revolutionary technologies, industry no

Computer Techniques for Dynamic Modeling of DC-DC Power Converters

There are several families of DC/DC converters comprising hundreds of different topologies. Sorting through the various properties and characteristics is obviously a daunting task. Culled from the pages of the groundbreaking Advanced DC/DC Converters, this book provides a focused, concise overview of more than 50 topologies of multi-quadrant converters. All aspects of these topologies are illustrated through designs developed by the authors through the years. The book begins with multiple-quadrant converters followed by switched component (SC and SI) converters, multiple-lift push-pull switched-capacitor converters, and finally, multiple-quadrant soft-switching converters.

Power Electronics and Energy Conversion Systems, Fundamentals and Hard-switching Converters

An examination of all of the multidisciplinary aspects of medium- and high-power converter systems, including basic power electronics, digital control and hardware, sensors, analog preprocessing of signals, protection devices and fault management, and pulse-width-modulation (PWM) algorithms, Switching Power Converters: Medium and High Power, Second Edition discusses the actual use of industrial technology and its related subassemblies and components, covering facets of implementation otherwise overlooked by theoretical textbooks. The updated Second Edition contains many new figures, as well as new and/or improved chapters on: Thermal management and reliability Intelligent power modules AC/DC and DC/AC current source converters Multilevel converters Use of IPM within a "network of switches" concept Power semiconductors Matrix converters Practical aspects in building power converters Providing the latest research and development information, along with numerous examples of successful home appliance, aviation, naval, automotive electronics, industrial motor drive, and grid interface for renewable energy products, this edition highlights advancements in packaging technologies, tackles the advent of hybrid circuits able to incorporate control and power stages within the same package, and examines design for reliability from the system level perspective.

Robust Control of DC-DC Converters

First Published in 2017. Routledge is an imprint of Taylor & Francis, an Informa company.

Soft Commutation Isolated DC-DC Converters

This book describes synergetic innovation opportunities offered by combining the field of power conversion with the field of integrated circuit (IC) design. The authors demonstrate how integrating circuits enables increased operation frequency, which can be exploited in power converters to reduce drastically the size of the discrete passive components. The authors introduce multiple power converter circuits, which are very compact as result of their high level of integration. First, the limits of high-power-density low-voltage monolithic switched-capacitor DC-DC conversion are investigated to enable on-chip power granularization. AC-DC conversion from the mains to a low voltage DC is discussed,

enabling an efficient and compact, lower-power auxiliary power supply to take over the power delivery during the standby mode of mains-connected appliances, allowing the main power converter of these devices to be shut down fully.

Digital Control of High-Frequency Switched-Mode Power Converters

For the first time in power electronics, this comprehensive treatment of switch-mode DC/DC converter designs addresses many analytical closed form equations such as duty cycle prediction, output regulation, output ripple, control loop-gain, and steady state time-domain waveform. Each of these equations are given various topologists and configurations, including forward, flyback, and boost converters. Pulse Width Modulated DC/DC Converters begins with a detailed approach to the quiescent operating locus of a power plant under open-loop. The reader is then led through other supporting circuits once again in the quiescent condition. These exercises result in the close-loop formulations of the subject system, providing designers with the ability to study the sensitivities of a system against disturbances. With the quiescent conditions well established, the book then guides the reader further into the territories of system stability where small signal behaviors are explored. Finally, some important large signal time-domain studies cap the treatment. Some distinctive features of this book include: *detailed coverage of dynamic close-loop converter simulations using only personal computer and modern mathematical software *Steady-state, time-domain analysis based on the concept of continuity of states Voltage-mode and current-mode control techniques and their differences of merits A detailed description on setting up different equations for DC/DC converters'simulation using only PC

Power-Switching Converters

This text reveals all key components of rectification, inversion, cycloconversion, and conversion circuits. It authoritatively describes switching, voltage and current relationships, and converter properties, operation, control, and performance as utilized in most practical applications. Authored jointly by a veteran scholar and an accomplished researcher in the field Power Converter Circuits highlights methods grounded in classical mathematics and includes an abundance of numerical worked examples. Features hundreds of chapter-specific problems, with solutions provided separately at the end of the book

Advanced Multi-Quadrant Operation DC/DC Converters

This is the definitive reference for anyone involved in pulsewidth modulated DC-to-DC power conversion Pulsewidth Modulated DC-to-DC Power Conversion: Circuits, Dynamics, and Control Designs provides engineers, researchers, and students in the power electronics field with comprehensive and complete guidance to understanding pulsewidth modulated (PWM) DC-to-DC power converters. Presented in three parts, the book addresses the circuitry and operation of PWM DC-to-DC converters and their dynamic characteristics, along with in-depth discussions of control design of PWM DC-to-DC converters. Topics include: Basics of DC-to-DC power conversion DC-to-DC converter circuits Dynamic modeling Power stage dynamics Closed-loop performance Voltage mode control and feedback design Current mode control and compensation design Sampling effects of current mode control Featuring fully tested problems and simulation examples as well as downloadable lecture slides and ready-to-run PSpice programs, Pulsewidth Modulated DC-to-DC Power Conversion is an ideal reference book for professional engineers as well as graduate and undergraduate students.

Switching Power Converters

This book examines a number of topics, mainly in connection with advances in semiconductor devices and magnetic materials and developments in medium and large-scale renewable power plant technologies, grid integration techniques and new converter topologies, including advanced digital control systems for medium-voltage networks. The book’s individual chapters provide an extensive compilation of fundamental theories and in-depth information on current research and development trends, while also exploring new approaches to overcoming some critical limitations of conventional grid integration technologies. Its main objective is to present the design and implementation processes for medium-voltage converters, allowing the direct grid integration of renewable power plants without the need for step-up transformers.

Switch Mode Power Conversion

ORGANIC REACTIONS CYCLIZATION REACTIONS OF NITROGEN-CENTERED RADICALS Stuart W. McCombie, Béatrice Quiclet-Sire, and Samir Z. Zard TRANSITION-METAL-CATALYZED AMINOOXYGENATION OF ALKENES Sherry R. Chemler, Dake Chen, Shuklendu D. Karyakarte, Jonathan M. Shikora, and Tomasz Wdowik

High-Ratio Voltage Conversion in CMOS for Efficient Mains-Connected Standby

"This new book demonstrates the usefulness of the switching function in analyzing power electronic circuits in the steady state. A procedure is suggested for the effective application of this method for the analysis of all types of power electronic circuits."--BOOK JACKET.

Pulse Width Modulated DC-DC Converters

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

Power Converter Circuits

Power Electronics is a large size technology, mainly covering four categories: the AC/DC rectifiers, DC/DC converters, DC/AC inverters, and AC/AC converters. This book offers approximately 100 novel topologies of all four. The applications are used in sustainable energy generation areas, such as distributed generation (DG), micro-grid (MG), smart grid (SG) systems, and electrical vehicles (EV). With case studies from GE, AEG, Simplatroll Ltd, and Chinese Power Manufacturing Co., the reader will be exposed to practical applications in industry and real-world settings. This new edition features an entirely new chapter on best switching angles to obtain lowest THD for multilevel DC/AC inverters. Additionally, all chapters have been updated and include homework problems throughout.

Pulsewidth Modulated DC-to-DC Power Conversion

Photovoltaic (PV) energy generation is an excellent example of large-scale electric power generation through various parallel arrangements of small voltage-generating solar cells or modules. However, PV generation systems require power electronic converters system to satisfy the need for real-time applications or to balance the demand for power from electric. Therefore, a DC-DC power converter is a vital constituent in the intermediate conversion stage of PV power. This book presents a comprehensive review of various non-isolated DC-DC power converters. Non-isolated DC-DC converters for renewable energy system (RES) application presented in this book 1st edition through a detailed original investigation, obtained numerical/experimental results, and guided the scope to design new families of converters: DC-DC multistage power converter topologies, Multistage "X-Y converter family\

Power Converters for Medium Voltage Networks