

## Converter

This book covers advancements of power electronic converters and their control techniques for grid integration of large-scale renewable energy sources and electrical vehicles. Major emphasis are on transformer-less direct grid integration, bidirectional power transfer, compensation of grid power quality issues, DC system protection and grounding, interaction in mixed AC/DC system, AC and DC system stability, magnetic design for high-frequency high power density systems with advanced soft magnetic materials, modelling and simulation of mixed AC/DC system, switching strategies for enhanced efficiency, and protection and reliability for sustainable grid integration. This book is an invaluable resource for professionals active in the field of renewable energy and power conversion.

This book provides an overview of power electronic converters for numerical simulations based on DIgSILENT PowerFactory. It covers the working principles, key assumptions and implementation of models of different types of these power systems. The book is divided into three main parts: the first discusses high-voltage direct currents, while the second part examines distribution systems and micro-grids. Lastly, the third addresses the equipment and technologies used in modelling and simulation. Each chapter includes practical examples and exercises, and the accompanying software illustrates essential models, principles and performance using DIgSILENT PowerFactory. Exploring various current topics in the field of modelling power systems, this book will appeal to a variety of readers, ranging from students to practitioners.

Curious about Facelets, but short on time for trying a new product? This short cut shows you how to start developing web pages quickly with Facelets, the new JavaServer Faces-based templating framework. This short cut begins with an explanation of what Facelets is, how it works, and what it will do for you. Then, it shows you how to install Facelets, and teaches you how to build Facelets templates, how to create UI components without writing a single line of Java code, how to create custom Facelets tags, how to integrate AJAX into a Facelets application, and more. Facelets unleashes the power and versatility of Faces by replacing the default JSP view handler with an xhtml template compiler. This short cut shows how Facelets lessens development time and improves code reusability. Are you ready to build a top-notch JSF user interface with Facelets? Power up your computer and let's go.

Converter-Based Dynamics and Control of Modern Power Systems addresses the ongoing changes and challenges in rotating masses of synchronous generators, which are transforming dynamics of the electrical system. These changes make it more important to consider and understand the role of power electronic systems and their characteristics in shaping the subtleties of the grid and this book fills that knowledge gap. Balancing theory, discussion, diagrams, mathematics, and data, this reference provides the information needed to acquire a thorough overview of resilience issues and frequency definition and estimation in modern power systems. This book offers an overview of classical power system dynamics and identifies ways of establishing future challenges and how they can be considered at a global level to overcome potential problems. The book is designed to prepare future engineers for operating a system that will be driven by electronics and less by electromechanical systems. Includes theory on the emerging topic of electrical grids based on power electronics Creates a good bridge between traditional theory and modern theory to support researchers and engineers Links the two fields of power systems and power electronics in electrical engineering

The era of the personal computer has, without doubt, permanently altered our life style in a myriad of ways. The "brain" of the personal computer is the microprocessor (together with RAM and ROM) which makes the decisions needed for the computer to perform in the desired

manner. The microprocessor continues to evolve as increasingly complex tasks are required. While not sharing the limelight of the microprocessor, the "heart" of the personal computer, namely the power supply, is equally important since without the necessary source of power the microprocessor would be a useless piece of silicon. The power supply of twenty years ago was much different than its modern day equivalent. At the dawn of the personal computer era in the late 1970s, de power was obtained from a simple diode bridge. However, the need for smooth, regulated DC at low voltage required at the same time both a bulky input transformer and a large dc side fltler. Those computer fans present at the birth of this industry can remember the large boxes housing our Altair, Cromemco and Northstar computers which was made necessary largely because of the huge power supply. It is not well appreciated but certainly true that the huge sucess of the Apple II computer in those days was due, at least in part, to the relatively slim proffle of the machine. This sleek appearance was largely due to the adoption of the then new and unproven switched mode power supply.

This text presents the design of data converters for emerging standards and introduces the underlying circuit design principles. It is an excellent reference for IC and mixed signal designers, design managers and project leaders in industry, particularly those in the wireless semiconductor industry.

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.

' Technical problems often lead to differential equations with piecewise-smooth right-hand sides. Problems in mechanical engineering, for instance, violate the requirements of smoothness if they involve collisions, finite clearances, or stick-slip phenomena. Systems of this type can display a large variety of complicated bifurcation scenarios that still lack a detailed description. This book presents some of the fascinating new phenomena that one can observe in piecewise-smooth dynamical systems. The practical significance of these phenomena is demonstrated through a series of well-documented and realistic applications to switching power converters, relay systems, and different types of pulse-width modulated control systems. Other examples are derived from mechanical engineering, digital electronics, and economic business-cycle theory. The topics considered in the book include abrupt transitions associated with modified period-doubling, saddle-node and Hopf bifurcations, the interplay between classical bifurcations and border-collision bifurcations, truncated bifurcation scenarios, period-tripling and -quadrupling bifurcations, multiple-choice bifurcations, new types of direct transitions to chaos, and torus destruction in nonsmooth systems. In spite of its orientation towards engineering problems, the book addresses theoretical and numerical problems in

sufficient detail to be of interest to nonlinear scientists in general. Contents: On the Dynamics of Nonlinear Systems Basic Concepts and Methods Relay Control Systems Bifurcations and Chaotic Oscillations in Relay Systems Chaotic Oscillations in Pulse-Width Modulated Systems Border-Collision Bifurcations on a Two-Dimensional Torus Border-Collision Bifurcations in a Management System Readership: Graduate students and researchers in nonlinear science and chaos theory; electrical and electronic engineers; experts in control theory and in applied mathematics. Keywords: Chaos; Bifurcations; Border-Collision Bifurcations; Piecewise-Smooth Dynamical Systems; Relay Control Systems; Pulse-Width Modulated Control Systems; Power Converters; Human Decision-Making Behavior Reviews: "This book is an important guide for engineers and all scientists working with non-smooth models." Mathematical Reviews "The book contains interesting examples of piecewise-smooth dynamical systems and its bifurcation phenomena with direct applications ... it will certainly be a useful tool for many scientists and engineers." Zentralblatt MATH

The book presents the analysis and control of numerous DC-DC converters widely used in several applications such as standalone, grid integration, and motor drives-based renewable energy systems. The book provides extensive simulation and practical analysis of recent and advanced DC-DC power converter topologies. This self-contained book contributes to DC-DC converters design, control techniques, and industrial as well as domestic applications of renewable energy systems. This volume will be useful for undergraduate/postgraduate students, energy planners, designers, system analysis, and system governors.

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

This thesis proposes new power converter topologies suitable for aircraft systems. It also proposes both AC-DC and DC-DC types of converters for different electrical loads to improve the performance these systems. To increase fuel efficiency and reduce environmental impacts, less efficient non-electrical aircraft systems are being replaced by electrical systems. However, more electrical systems requires more electrical power to be generated in the aircraft. The increased consumption of electrical power in both civil and military aircrafts has necessitated the use of more efficient electrical power conversion technologies. This book presents a comprehensive mathematical analysis and the design and digital simulation of the power converters. Subsequently it discusses the construction of the hardware prototypes of each converter and the experimental tests carried out to verify the benefits of the proposed solutions in comparison to the existing solutions.

Presents Fundamentals of Modeling, Analysis, and Control of Electric Power Converters for Power System Applications Electronic (static) power conversion has gained widespread acceptance in power systems applications; electronic power converters are increasingly employed for power conversion and conditioning, compensation, and active filtering. This book presents the fundamentals for analysis and control of a specific class of high-power electronic converters—the three-phase voltage-sourced converter (VSC). Voltage-Sourced Converters in Power Systems provides a necessary and unprecedented link between the principles of operation and the applications of voltage-sourced converters. The book: Describes various functions that the VSC can perform in electric power systems Covers a wide range of applications of the VSC in electric power systems—including wind power conversion systems Adopts a systematic approach to the modeling and control design problems Illustrates the control design procedures and expected performance based on a comprehensive set of examples and digital computer time-domain simulation studies This comprehensive text presents effective techniques for mathematical modeling and control

design, and helps readers understand the procedures and analysis steps. Detailed simulation case studies are included to highlight the salient points and verify the designs. Voltage-Sourced Converters in Power Systems is an ideal reference for senior undergraduate and graduate students in power engineering programs, practicing engineers who deal with grid integration and operation of distributed energy resource units, design engineers, and researchers in the area of electric power generation, transmission, distribution, and utilization.

Converter-Based Dynamics and Control of Modern Power Systems Academic Press

Several emitter materials, tantalum, tungsten and rhenium, and two emitter geometries, planar and excess area were evaluated in a flexible laboratory thermionic converter design. Results are reported from six converters that were tested for a total of 1070 hr. Experimental results from the excess area emitter converters did not exhibit the current enhancement observed in multicapillary and slotted emitter converters developed on a previous Air Force contract. While the electron currents in the passive mode at relatively low cesium pressure were in qualitative agreement with theory, the actual current densities obtained were not high enough to produce practical power densities at high output voltage. The method of emitter fabrication which used a niobium braze material appears to be a primary reason for the low performance.

As concerns about climate change, energy prices, and energy security loom, regulatory and research communities have shown growing interest in alternative energy sources and their integration into distributed energy systems. However, many of the candidate microgeneration and associated storage systems cannot be readily interfaced to the 50/60 Hz grid. In Power Electronic Converters for Microgrids, Sharkh and Abu-Sara introduce the basics and practical concerns of analyzing and designing such micro-generation grid interface systems. Readers will become familiar with methods for stably feeding the larger grid, importing from the grid to charge on-site storage, disconnecting from the grid in case of grid failure, as well as connect multiple microgrids while sharing their loads appropriately. Sharkh and Abu-Sara introduce not only the larger context of the technology, but also present potential future applications, along with detailed case studies and tutorials to help the reader effectively engineer microgrid systems.

Resource added for the Automotive Technology program 106023.

Research and application of impedance network converters are very popular in recent years, but it still lacks of understanding of and guidelines of impedance networks application, therefore, there is quiet a large potential market about impedance networks converters. This book can serve as a teaching material for graduates and guidelines for engineers as designing an impedance source converter. The main purpose of this book is to understand impedance networks of nonlinear switch circuits and impedance networks matching, which will further put forward understanding of all power converters in view of impedance networks. Taking the impedance network matchings into account leads to a set of criteria for designing an impedance source converter, which is to replace the traditional tedious, manual and experience-dependent design methods.

Grid converters are the key player in renewable energy integration. The high penetration of renewable energy systems is calling for new more stringent grid requirements. As a consequence, the grid converters should be able to exhibit advanced functions like: dynamic control of active and reactive power, operation within a wide range of voltage and frequency, voltage ride-through capability, reactive current injection during faults, grid services support. This book explains the topologies, modulation and control of grid converters for both photovoltaic and wind power applications. In addition to power electronics, this book focuses on the specific applications in photovoltaic wind power systems where grid condition is an essential factor. With a review of the most recent grid requirements for photovoltaic and wind power systems, the

book discusses these other relevant issues: modern grid inverter topologies for photovoltaic and wind turbines islanding detection methods for photovoltaic systems synchronization techniques based on second order generalized integrators (SOGI) advanced synchronization techniques with robust operation under grid unbalance condition grid filter design and active damping techniques power control under grid fault conditions, considering both positive and negative sequences Grid Converters for Photovoltaic and Wind Power Systems is intended as a coursebook for graduated students with a background in electrical engineering and also for professionals in the evolving renewable energy industry. For people from academia interested in adopting the course, a set of slides is available for download from the website.

[www.wiley.com/go/grid\\_converters](http://www.wiley.com/go/grid_converters)

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.

This book is a technical publication for students, scholars and engineers in electrical engineering, focusing on the pulse-width-modulation (PWM) technologies in power electronics area. Based on an introduction of basic PWM principles this book analyzes three major challenges for PWM on system performance: power losses, voltage/current ripple and electromagnetic interference (EMI) noise, and the lack of utilization of control freedoms in conventional PWM technologies. Then, the model of PWM's impact on system performance is introduced, with the current ripple prediction method for voltage source converter as example. With the prediction model, two major advanced PWM methods are introduced: variable switching frequency PWM and phase-shift PWM, which can reduce the power losses and EMI for the system based on the prediction model. Furthermore, the advanced PWM can be applied in advanced topologies including multilevel converters and paralleled converters. With more control variables in the advanced topologies, performance of PWM can be further improved. Also, for the special problem for common-mode noise, this book introduces modified PWM method for reduction. Especially, the paralleled inverters with advanced PWM can achieve good performance for the common-mode noise reduction. Finally, the implementation of PWM technologies in hardware is introduced in the last part.

This book deals with modeling and implementation of high performance, current-steering D/A-converters for digital transceivers in nanometer CMOS technology. In the first part, the fundamental performance limitations of current-steering DACs are discussed. Based on simplified models, closed-form expressions for a number of basic non-ideal effects are derived and tested. With the knowledge of basic performance limits, the converter and system architecture can be optimized in an early design phase, trading off circuit complexity, silicon area and power dissipation for static and dynamic performance. The second part describes four different current-steering DAC designs in standard 130 nm CMOS. The converters have a resolution in the range of 12-14 bits for an analog bandwidth between 2.2 MHz and 50 MHz and sampling rates from 100 MHz to 350 MHz. Dynamic-Element-Matching (DEM) and advanced dynamic current calibration techniques are employed to minimize the required silicon area.

Power electronics is a discipline spawned by real-life applications in industrial, commercial, residential and aerospace environments. Much of its development evolves around some immediate need for solving specific power conversion problems. This comprehensive book focuses on the typical bifurcation scenarios and nonlinear behavior observed in swit

Vols. for 1970-79 include an annual special issue called IEE reviews.

CMOS Integrated Analog-to-Digital and Digital-to-Analog Converters describes in depth converter specifications like Effective Number of Bits (ENOB), Spurious Free Dynamic Range (SFDR), Integral Non-Linearity (INL), Differential Non-Linearity (DNL) and sampling clock jitter requirements. Relations between these specifications and practical issues like matching of components and offset parameters of differential pairs are derived. CMOS Integrated Analog-to-Digital and Digital-to-Analog Converters describes the requirements of input and signal reconstruction filtering in case a converter is applied into a signal processing system. CMOS Integrated Analog-to-Digital and Digital-to-Analog Converters describes design details of high-speed A/D and D/A converters, high-resolution A/D and D/A converters, sample-and-hold amplifiers, voltage and current references, noise-shaping converters and sigma-delta converters, technology parameters and matching performance, comparators and limitations of comparators and finally testing of 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 80 topologies, developed by the authors, of essential DC/DC converters. The authors begin with an introduction to the basics of DC/DC conversion technology, then present an in-depth analysis of voltage-lift and super-lift converters. This book also includes a brand new chapter on the revolutionary ultra-lift Luo-converter. Several experimental and simulation results clearly illustrate the concepts.

This book describes two target applications for synchronous systems: regulated 3-phase voltage supply and voltage sag mitigation. It presents a detailed design procedure for converter switches and filters considering all steady-state, commutation and dynamic requirements. This work has evolved from previously published research by the authors, which in turn is part of a larger effort to expand the application domain of matrix converters to power systems. The objectives of the work have been categorized into the following: developing a dynamic model that provides adequate design insights; designing filters; and devising a control scheme. The low frequency dynamic model is first analyzed for regulated voltage supplies assuming balanced system. The system is modeled relative to a synchronous rotating (dq) frame linearized around an operating point. The input-output variables are related by non-diagonal transfer function matrices. Individual transfer function sub-matrices are sequentially investigated and it is shown that, depending on the input power, input voltage and filter parameters, the appearance of a set of right half zeros is possible. The book then considers filter design, as well as general issues like ripple attenuation, regulation, reactive current loading, and filter losses. The book also addresses additional constraints that may be imposed by dynamic requirements and commutation. In the third stage, voltage controller design is detailed for a 3-phase regulated voltage supply. In dq domain, output voltage control represents a multivariable control problem. This is reduced to a single variable control problem while retaining all possible right half zeros, thereby preserving the internal stability of the system. Consequently, the standard single variable control design technique has been used to design a controller. The analytically predicted dynamic response has been verified by experimental results. It was possible to operate the system beyond the critical power boundary where the right half zeros emerge. Lastly, the developed control approach has been extended to voltage sag mitigation with adequate modifications. A 3-wire linear load and both symmetrical and asymmetrical

voltage sags have been considered. Experimentally obtained response time for sag mitigation was found to be less than the power supply holdup time of most of the sensitive equipment. This book will be useful to both researchers and graduate students.

The emphasis of this book is on practical design aspects for broadband A/D converters for communication systems. The embedded designs are employed for transceivers in the field of ADSL solutions and WLAN applications. An area- and power-efficient realization of a converter is mandatory to remain competitive in the market. The right choice for the converter topology and architecture needs to be done very carefully to result in a competitive FOM. The book begins with a brief overview of basic concepts about ADSL and WLAN to understand the ADC requirements. At architectural level, issues on different modulator topologies are discussed employing the provided technology node. The design issues are pointed out in detail for modern digital CMOS technologies, beginning with 180nm followed by 130nm and going down to 65nm feature size. Beside practical aspects, challenges to mixed-signal design level are addressed to optimize the converters in terms of consumed chip area, power consumption and design for high yield in volume production. Thus, careful considerations on circuit- and architectural- level are performed by introducing a dynamic-biasing technique, a feed-forward approach and a resolution in time instead of amplitude resolution.

CMOS Telecom Data Converters compiles the latest achievements regarding the design of high-speed and high-resolution data converters in deep submicron CMOS technologies. The four types of analog-to-digital converter architectures commonly found in this arena are covered, namely sigma-delta, pipeline, folding/interpolating and flash. For all these types, latest achievements regarding the solution of critical architectural and circuital issues are presented, and illustrated through IC prototypes with measured state-of-the-art performances. Some of these prototypes are conceived to be employed at the chipset of newest generation wireline modems (ADSL and ADSL+). Others are intended for wireless transceivers. Besides analog-to-digital converters, the book also covers other functions needed for communication systems, such as digital-to-analog converters, analog filters, programmable gain amplifiers, digital filters, and line drivers.

In this original book on model predictive control (MPC) for power electronics, the focus is put on high-power applications with multilevel converters operating at switching frequencies well below 1 kHz, such as medium-voltage drives and modular multi-level converters. Consisting of two main parts, the first offers a detailed review of three-phase power electronics, electrical machines, carrier-based pulse width modulation, optimized pulse patterns, state-of-the art converter control methods and the principle of MPC. The second part is an in-depth treatment of MPC methods that fully exploit the performance potential of high-power converters. These control methods combine the fast control responses of deadbeat control with the optimal steady-state performance of optimized pulse patterns by resolving the antagonism between the two. MPC is expected to evolve into the control method of choice for power electronic systems operating at low pulse numbers with multiple coupled variables and tight operating constraints it. Model Predictive Control of High Power Converters and Industrial Drives will enable to reader to learn how to increase the power capability of the converter, lower the current distortions, reduce the filter size, achieve very fast transient responses and ensure the reliable operation within safe operating area constraints. Targeted at power electronic practitioners working on control-related aspects as well as control engineers, the material is intuitively accessible, and the mathematical formulations are augmented by illustrations, simple examples and a book companion website featuring animations. Readers

benefit from a concise and comprehensive treatment of MPC for industrial power electronics, enabling them to understand, implement and advance the field of high-performance MPC schemes.

Impedance Source Power Electronic Converters brings together state of the art knowledge and cutting edge techniques in various stages of research related to the ever more popular impedance source converters/inverters. Significant research efforts are underway to develop commercially viable and technically feasible, efficient and reliable power converters for renewable energy, electric transportation and for various industrial applications. This book provides a detailed understanding of the concepts, designs, controls, and application demonstrations of the impedance source converters/inverters. Key features: Comprehensive analysis of the impedance source converter/inverter topologies, including typical topologies and derived topologies. Fully explains the design and control techniques of impedance source converters/inverters, including hardware design and control parameter design for corresponding control methods. Presents the latest power conversion solutions that aim to advance the role of power electronics into industries and sustainable energy conversion systems. Compares impedance source converter/inverter applications in renewable energy power generation and electric vehicles as well as different industrial applications. Provides an overview of existing challenges, solutions and future trends. Supported by calculation examples, simulation models and results. Highly accessible, this is an invaluable resource for researchers, postgraduate/graduate students studying power electronics and its application in industry and renewable energy conversion as well as practising R&D engineers. Readers will be able to apply the presented material for the future design of the next generation of efficient power electronic converters/inverters.

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",  $N_x$  IMBC ( $N_x$  Interleaved Multilevel Boost Converter), Cockcroft Walton (CW) Voltage Multiplier-Based Multistage/Multilevel Power Converter (CW-VM-MPC) converter topologies, and Z-source and quasi Z-source. Above solutions are discussed to show how they can achieve the maximum voltage conversion gain ratio by adapting the passive/active component within the circuits. For assessment, we have recommended novel power converters through their functionality and designs, tested and verified by numerical software. Further, the hardware prototype implementation is carried out through a flexible digital processor. Both numerical and experimental results always shown as expected close agreement with primary theoretical hypotheses. This book offers guidelines and recommendation for future development with the DC-DC converters for RES applications based on cost-effective, and reliable solutions.

Designed to complement a range of power electronics study resources, this unique lab manual helps students to gain a deep understanding of the operation, modeling, analysis, design, and performance of pulse-width modulated (PWM) DC-DC power converters. Exercises focus on three essential areas of power electronics: open-loop power stages; small-signal modeling, design of feedback loops and PWM DC-DC converter control schemes; and semiconductor devices such as silicon, silicon carbide and gallium nitride. Meeting the standards required by industrial employers, the lab manual combines programming language with a simulation tool designed for proficiency in the theoretical and practical concepts. Students and instructors can choose from an extensive list of topics involving simulations on MATLAB, SABER, or SPICE-based platforms, enabling readers to gain the most out of the prelab, inlab, and postlab activities. The laboratory exercises have been taught and continuously improved for over 25 years by Marian K. Kazimierzczuk thanks to constructive student feedback and valuable suggestions on possible workroom improvements. This up-to-date and informative teaching material is now available for the benefit of a wide audience. Key features: Includes complete designs to give students a quick overview of the converters, their characteristics, and fundamental analysis of operation. Compatible with any programming tool (MATLAB, Mathematica, or Maple) and any circuit simulation tool (PSPice, LTSpice, Synopsys SABER, PLECS, etc.). Quick design section enables students and instructors to verify their design methodology for instant simulations. Presents lab exercises based on the most recent advancements in power electronics, including multiple-output power converters, modeling, current- and voltage-mode control schemes, and power semiconductor devices. Provides comprehensive appendices to aid basic understanding of the fundamental circuits, programming and simulation tools. Contains a quick component selection list of power MOSFETs and diodes together with their ratings, important specifications and Spice models.

Power Converters for Electric Vehicles gives an overview, topology, design, and simulation of different types of converters used in electric vehicles (EV). It covers a wide range of topics ranging from the fundamentals of EV, Hybrid EV and its stepwise approach, simulation of the proposed converters for real-time applications and corresponding experimental results, performance improvement paradigms, and overall analysis. Drawing upon the need for novel converter topologies, this book provides the complete solution for the power converters for EV applications along with simulation exercises and experimental results. It explains the need for power electronics in the improvement of performance in EV. This book: Presents exclusive information on the power electronics of EV including traction drives. Provides step-by-step procedure for converter design. Discusses various topologies having different isolated and non-isolated converters. Describes control circuit design including renewable energy systems and electrical drives. Includes practical case studies incorporated with simulation and experimental results. Power Converters for Electric Vehicles will provide researchers and graduate students in Power Electronics, Electric Drives, Vehicle Engineering a useful resource for stimulating their efforts in this important field of the search for renewable technologies.

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