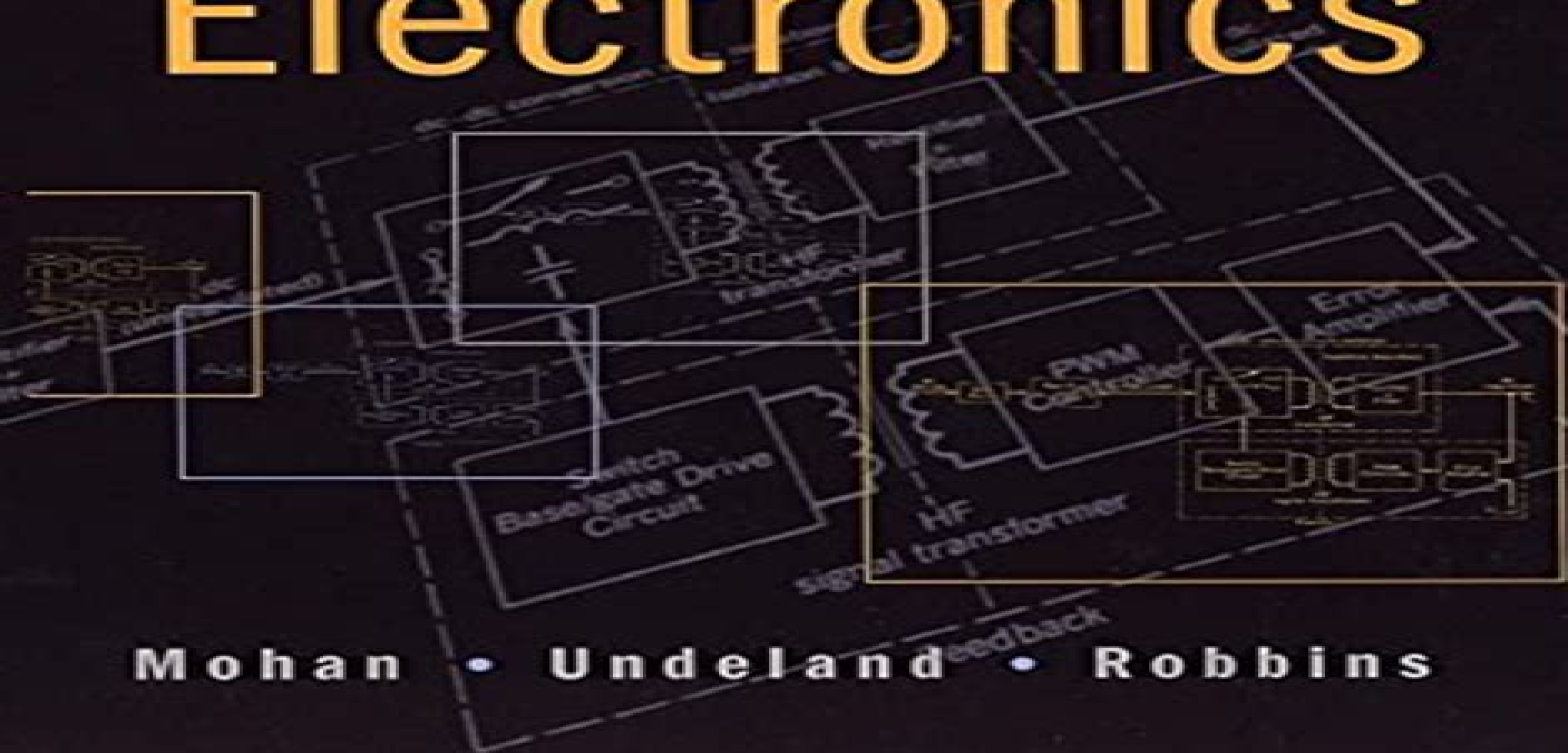


Media Enhanced Third Edition



Power Electronics

CONVERTERS,
APPLICATIONS,
AND DESIGN



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Power Electronics Converters Applications And Design

3rd Edition

Ramu Krishnan



Power Electronics Converters Applications And Design 3rd Edition:

Power Electronics Ned Mohan, Tore M. Undeland, William P. Robbins, 2003 CD ROM contains PSpice based simulation to illustrate basic concepts magnetic component design program PowerPoint slides to summarise topics companion web site available *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 Electric Powertrain John G. Hayes, G. Abas Goodarzi, 2017-11-13 The why what and how of the electric vehicle powertrain Empowers engineering professionals and students with the knowledge and skills required to engineer electric vehicle powertrain architectures energy storage systems power electronics converters and electric drives The modern electric powertrain is relatively new for the automotive industry and engineers are challenged with designing affordable efficient and high performance electric powertrains as the industry undergoes a technological evolution Co authored by two electric vehicle EV engineers with decades of experience designing and putting into production all of the powertrain technologies presented this book provides readers with the hands on knowledge skills and expertise they need to rise to that challenge This four part practical guide provides a comprehensive review of battery hybrid and fuel cell EV systems and the associated energy sources power electronics machines and drives Introduces and holistically integrates the key EV powertrain technologies Provides a comprehensive overview of existing and emerging automotive solutions Provides experience based expertise for vehicular and powertrain system and sub system level study design and optimization Presents many examples of powertrain technologies from leading manufacturers Discusses the dc traction machines of the Mars rovers the ultimate EVs from NASA Investigates the environmental motivating factors and impacts of electromobility Presents a structured university teaching stream from introductory undergraduate to postgraduate Includes real world problems and assignments of use to design engineers researchers and students alike Features a companion website with numerous references problems solutions and practical assignments Includes introductory material throughout the book for the general scientific reader Contains essential reading for government regulators and policy makers *Electric Powertrain Energy Systems Power Electronics and Drives for Hybrid Electric and Fuel Cell Vehicles* is an important professional resource for practitioners and researchers in the battery hybrid and fuel cell EV transportation industry The

resource is a structured holistic textbook for the teaching of the fundamental theories and applications of energy sources power electronics and electric machines and drives to engineering undergraduate and postgraduate students

Power Electronics, A First Course Ned Mohan, Siddharth Raju, 2023-01-12 POWER ELECTRONICS A FIRST COURSE Enables students to understand power electronics systems as one course in an integrated electric energy systems curriculum Power Electronics A First Course provides instruction on fundamental concepts related to power electronics to undergraduate electrical engineering students beginning with an introductory chapter and moving on to discussing topics such as switching power poles switch mode dc dc converters and feedback controllers The authors also cover diode rectifiers power factor correction PFC circuits and switch mode dc power supplies Later chapters touch on soft switching in dc dc power converters voltage and current requirements imposed by various power applications dc and low frequency sinusoidal ac voltages thyristor converters and the utility applications of harnessing energy from renewable sources Power Electronics A First Course is the only textbook that is integrated with hardware experiments and simulation results The simulation files are available on a website associated with this textbook The hardware experiments will be available through a University of Minnesota startup at a low cost In Power Electronics A First Course readers can expect to find detailed information on Availability of various power semiconductor devices that are essential in power electronic systems plus their switching characteristics and various tradeoffs Common foundational unit of various converters and their operation plus fundamental concepts for feedback control illustrated by means of regulated dc dc converters Basic concepts associated with magnetic circuits to develop an understanding of inductors and transformers needed in power electronics Problems associated with hard switching and some of the practical circuits where this problem can be minimized with soft switching Power Electronics A First Course is an ideal textbook for Junior Senior Undergraduate students in Electrical and Computer Engineering ECE It is also valuable to students outside of ECE such as those in more general engineering fields Basic understanding of electrical engineering concepts and control systems is a prerequisite

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

High-Power Converters and AC Drives Bin Wu, Mehdi Narimani, 2017-01-17 A comprehensive reference of the latest developments in MV drive technology in the area of power converter topologies This new edition reflects the recent technological advancements in the MV drive industry such as advanced multilevel converters and drive configurations It includes three new chapters Control of Synchronous Motor Drives Transformerless MV Drives and Matrix Converter Fed Drives In addition there are extensively revised chapters on Multilevel Voltage Source Inverters and Voltage Source Inverter Fed Drives This book includes a systematic analysis on a variety of high power multilevel converters illustrates important concepts with simulations and experiments introduces various megawatt drives produced by world leading drive manufacturers and addresses practical problems and their mitigations methods This new edition Provides an in depth discussion and analysis of various control schemes for the MV synchronous motor drives Examines new technologies developed to eliminate the isolation transformer in the MV drives Discusses the operating principle and modulation schemes of matrix converter MC topology and multi module cascaded matrix converters CMCs for MV drives and their application in commercial MV drives Bin Wu is a Professor and Senior NSERC Rockwell Automation Industrial Research Chair in Power Electronics and Electric Drives at Ryerson University Canada He is a fellow of Institute of Electrical and Electronics Engineers IEEE Engineering Institute of Canada EIC and Canadian Academy of Engineering CAE Dr Wu has published more than 400 papers and holds more than 30 granted pending US European patents He co authored several books including Power Conversion and Control of Wind Energy Systems and Model Predictive Control of Wind Energy Conversion Systems both by Wiley IEEE Press Mehdi Narimani is a Postdoctoral Research Associate with the Department of Electrical and computer Engineering at Ryerson University Canada and Rockwell Automation Canada He is a senior member of IEEE Dr Narimani is author co author of more than 50 technical papers and four US European patents issued pending review His current research interests include power conversion high power converters control of power electronics and renewable energy systems

Electric Power Generation, Transmission, and Distribution, Third Edition Leonard L. Grigsby, 2012-05-16 Featuring contributions from worldwide leaders in the field the carefully crafted Electric Power Generation Transmission and Distribution Third Edition part of the five volume set The Electric Power Engineering Handbook provides convenient access to detailed information on a diverse array of power engineering topics Updates to nearly every chapter keep this book at the forefront of developments in modern power systems reflecting international standards practices and technologies Topics covered include Electric power generation nonconventional methods Electric power generation conventional methods

Transmission system Distribution systems Electric power utilization Power quality L L Grigsby a respected and accomplished authority in power engineering and section editors Saifur Rahman Rama Ramakumar George Karady Bill Kersting Andrew Hanson and Mark Halpin present substantially new and revised material giving readers up to date information on core areas These include advanced energy technologies distributed utilities load characterization and modeling and power quality issues such as power system harmonics voltage sags and power quality monitoring With six new and 16 fully revised chapters the book supplies a high level of detail and more importantly a tutorial style of writing and use of photographs and graphics to help the reader understand the material New chapters cover Water Transmission Line Reliability Methods High Voltage Direct Current Transmission System Advanced Technology High Temperature Conduction Distribution Short Circuit Protection Linear Electric Motors A volume in the Electric Power Engineering Handbook Third Edition Other volumes in the set K12648 Power Systems Third Edition ISBN 9781439856338 K13917 Power System Stability and Control Third Edition ISBN 9781439883204 K12650 Electric Power Substations Engineering Third Edition ISBN 9781439856383 K12643 Electric Power Transformer Engineering Third Edition ISBN 9781439856291

Advanced Electric Drive Vehicles Ali Emadi, 2014-10-02 Electrification is an evolving paradigm shift in the transportation industry toward more efficient higher performance safer smarter and more reliable vehicles There is in fact a clear trend to move from internal combustion engines ICEs to more integrated electrified powertrains Providing a detailed overview of this growing area Advanced Electric Drive Vehicles begins with an introduction to the automotive industry an explanation of the need for electrification and a presentation of the fundamentals of conventional vehicles and ICEs It then proceeds to address the major components of electrified vehicles i e power electronic converters electric machines electric motor controllers and energy storage systems This comprehensive work Covers more electric vehicles MEVs hybrid electric vehicles HEVs plug in hybrid electric vehicles PHEVs range extended electric vehicles REEVs and all electric vehicles EVs including battery electric vehicles BEVs and fuel cell vehicles FCVs Describes the electrification technologies applied to nonpropulsion loads such as power steering and air conditioning systems Discusses hybrid battery ultra capacitor energy storage systems as well as 48 V electrification and belt driven starter generator systems Considers vehicle to grid V2G interface and electrical infrastructure issues energy management and optimization in advanced electric drive vehicles Contains numerous illustrations practical examples case studies and challenging questions and problems throughout to ensure a solid understanding of key concepts and applications Advanced Electric Drive Vehicles makes an ideal textbook for senior level undergraduate or graduate engineering courses and a user friendly reference for researchers engineers managers and other professionals interested in transportation electrification

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

Advances in Induction and Microwave Heating of Mineral and Organic Materials Stanisław

Grundas,2011-02-14 The book offers comprehensive coverage of the broad range of scientific knowledge in the fields of advances in induction and microwave heating of mineral and organic materials Beginning with industry application in many areas of practical application to mineral materials and ending with raw materials of agriculture origin the authors specialists in different scientific area present their results in the two sections Section 1 Induction and Microwave Heating of Mineral Materials and Section 2 Microwave Heating of Organic Materials

Power Converters, Drives and Controls for Sustainable Operations S. Ganesh Kumar,Marco Rivera Abarca,S. K. Pattanaik,2023-07-25 POWER CONVERTERS DRIVES AND CONTROLS FOR SUSTAINABLE OPERATIONS Written and edited by a group of experts in the field this groundbreaking reference work sets the standard for engineers students and professionals working with power converters drives and controls offering the scientific community a way towards combating sustainable operations The future of energy and power generation is complex Demand is increasing and the demand for cleaner energy and electric vehicles EVs is increasing with it With this increase in demand comes an increase in the demand for power converters Part one of this book is on switched mode converters and deals with the need for power converters their topologies principles of operation their steady state performance and applications Conventional topologies like buck boost buck boost converters inverters multilevel inverters

and derived topologies are covered in part one with their applications in fuel cells photovoltaics PVs and EVs Part two is concerned with electrical machines and converters used for EV applications Standards for EV charging infrastructure and wireless charging methodologies are addressed The last part deals with the dynamic model of the switched mode converters In any DC DC converter it is imperative to control the output voltage as desired Such a control may be achieved in a variety of ways While several types of control strategies are being evolved the popular method of control is through the duty cycle of the switch at a constant switching frequency This part of the book briefly reviews the conventional control theory and builds on the same to develop advanced techniques in the closed loop control of switch mode power converters SMPC such as sliding mode control passivity based control model predictive control MPC fuzzy logic control FLC and backstepping control A standard reference work for veteran engineers scientists and technicians this outstanding new volume is also a valuable introduction to new hires and students Useful to academics researchers engineers students technicians and other industry professionals it is a must have for any library

Power Electronics Fang Lin Luo, Hong Ye, 2018-01-02 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

On the perspectives of SiC MOSFETs in high-frequency and high-power isolated DC/DC converters
Eial Awwad, Abdullah, 2020-08-11 Increasing demand for efficiency and power density pushes Si based devices to some of their inherent material limits including those related to temperature operation switching frequency and blocking voltage Recently SiC based power devices are promising candidates for high power and high frequency switching applications Today SiC MOSFETs are commercially available from several manufacturers Although technology affiliated with SiC MOSFETs is improving rapidly many challenges remain and some of them are investigated in this work The research work in this dissertation is divided into the three following parts Firstly the static and switching characteristics of the state of the art 1.2 kV planar and double trench SiC MOSFETs from two different manufacturers are evaluated The effects of different biasing voltages DC link voltages and temperatures are analysed The characterisation results show that the devices exhibit superior switching performances under different operating conditions Moreover several aspects of using the SiC MOSFET's body diode in a DC DC converter are investigated comparing the body diodes of planar and double trench devices Reverse recovery is evaluated in switching tests considering the case temperature switching rate forward current and applied voltage Based on the measurement results the junction temperature is estimated to guarantee safe operation A simple electro

thermal model is proposed in order to estimate the maximum allowed switching frequency based on the thermal design of the SiC devices. Using these results, hard and soft switching converters are designed and devices are characterised as being in continuous operation at a very high switching frequency of 1 MHz. Thereafter, the SiC MOSFETs are operated in a continuous mode in a 10 kW 100–250 kHz buck converter, comparing synchronous rectification, the use of the body diode and the use of an external Schottky diode. Further, the parallel operation of the planar devices is considered. Thus, the paralleling of SiC MOSFETs is investigated before comparing the devices in continuous converter operation. In this regard, the impact of the most common mismatch parameters on the static and dynamic current sharing of the transistors is evaluated, showing that paralleling of SiC MOSFETs is feasible. Subsequently, an analytical model of SiC MOSFETs for switching loss optimisation is proposed. The analytical model exhibits relatively close agreement with measurement results under different test conditions. The proposed model tracks the oscillation effectively during both turn on and off transitions. This has been achieved by considering the influence of the most crucial parasitic elements in both power and gate loops. In the second part, a comprehensive short circuit ruggedness evaluation focusing on different failure modes of the planar and double trench SiC devices is presented. The effects of different biasing voltages, DC link voltages and gate resistances are evaluated. Additionally, the temperature dependence of the short circuit capability is evaluated and the associated failure modes are analysed. Subsequently, the design and test of two different methods for overcurrent protection are proposed. The desaturation technique is applied to the SiC MOSFETs and compared to a second method that depends on the stray inductance of the devices. Finally, the benefits of using SiC devices in continuous high frequency high power DC/DC converters is experimentally evaluated. In this regard, a design optimisation of a high frequency transformer is introduced and the impact of different core materials, conductor designs and winding arrangements are evaluated. A ZVZCS Phase Shift Full Bridge unidirectional DC/DC converter is proposed using only the parasitic leakage inductance of the transformer. Experimental results for a 10 kW 100–250 kHz prototype indicate an efficiency of up to 98.1% for the whole converter. Furthermore, an optimized control method is proposed to minimise the circulation current in the isolated bidirectional dual active bridge DC/DC converter based on a modified dual phase shift control method. This control method is also experimentally compared with traditional single phase shift control, yielding a significant improvement in efficiency. The experimental results confirm the theoretical analysis and show that the proposed control can enhance the overall converter efficiency and expand the ZVZCS range.

Die steigende Nachfrage nach Effizienz und Leistungsdichte bringt Si-basierte Leistungsbauteile an einige ihrer Materialgrenzen, die unter anderem mit der Temperaturbelastung, der Schaltfrequenz und der Blockierspannung in Zusammenhang stehen. In jüngster Zeit sind SiC-basierte Leistungsbaulemente vielversprechende Kandidaten für Hochleistungs- und Hochfrequenzanwendungen. Aktuell sind SiC MOSFETs von mehreren Herstellern im Handel erhältlich. Obwohl sich die Technologie der SiC MOSFETs rasch verbessert, werden viele Herausforderungen bestehen bleiben. Einige

dieser Herausforderungen werden in dieser Arbeit untersucht Die Untersuchungen in dieser Dissertation gliedern sich in die drei folgenden Teile Im ersten Teil erfolgt die statische und die transiente Charakterisierung der aktuellen 1 2 kV Planar und Doubletrench SiC MOSFETs verschiedener Hersteller Die Auswirkungen unterschiedlicher Gatespannungen Zwischenkreisspannungen und Temperaturen werden analysiert Die Ergebnisse der Charakterisierung zeigen dass die Bauteile berlegene Schaltleistungen unter verschiedenen Betriebsbedingungen aufweisen Dar ber hinaus wird der Einsatz der internen SiC Bodydioden in einem DC DC Wandler untersucht wobei die Unterschiede zwischen Planar und Doppeltrench Bauteilen aufgezeigt werden Das Reverse Recovery Verhalten wird unter Ber cksichtigung der Geh usetemperatur der Schaltgeschwindigkeit des Durchlassstroms und der angelegten Spannung bewertet Anhand der Messergebnisse wird die Sperrschichttemperatur gesch tzt damit ein sicherer Betrieb gew hrleistet ist Ein einfaches elektrothermisches Modell wird vorgestellt um die maximal zul ssige Schaltfrequenz auf der Grundlage des thermischen Designs der SiC Bauteile abzusch tzen Anhand dieser Ergebnisse werden hart und weichschaltende Umrichter konzipiert und die Bauteile werden im Dauerbetrieb mit einer sehr hohen Schaltfrequenz von 1 MHz untersucht Danach werden die SiC MOSFETs im Dauerbetrieb in einem 10 kW 100 250 kHz Tiefsetzsteller betrieben Dabei wird die Synchrongleichrichtung die Verwendung der internen Diode und die Verwendung einer externen Schottky Diode verglichen Au erdem wird die Parallelisierung von SiC MOSFETs untersucht bevor die Parallelschaltung der verschiedenen Bauelemente ebenso im kontinuierlichen Konverterbetrieb verglichen wird Es wird der Einfluss der h ufigsten Parametervariationen auf die statische und dynamische Stromaufteilung der Transistoren analysiert was zeigt dass eine Parallelisierung von SiC MOSFETs m glich ist Anschlie end wird ein analytisches Modell der SiC MOSFETs zur Schaltverlustoptimierung vorgeschlagen Das analytische Modell zeigt eine relativ enge bereinstimmung mit den Messergebnissen unter verschiedenen Testbedingungen Das vorgeschlagene Modell bildet die Schwingungen sowohl beim Ein als auch beim Ausschalten effektiv nach Dies wurde durch die Ber cksichtigung der wichtigsten parasit ren Elemente in Strom und Gatekreisen erreicht Im zweiten Teil wird eine umfassende Bewertung der Kurzschlussfestigkeit mit Fokus auf verschiedene Ausfallmodi der planaren und double trench SiC Bauelemente vorgestellt Die Auswirkungen unterschiedlicher Gatespannungen Zwischenkreisspannungen und Gate Widerst nde werden ausgewertet Zus tzlich wird die temperaturabh ngige Kurzschlussf higkeit ausgewertet und die zugeh rigen Fehlerf lle werden analysiert Anschlie end wird die Auslegung und Pr fung von zwei verschiedenen Verfahren zum berstromschutz evaluiert Die Desaturation Technik wird auf SiC MOSFETs angewendet und mit einer zweiten Methode verglichen welche die parasit re Induktivit t der Bauelemente nutzt Schlie lich wird der Nutzen des Einsatzes von SiC Bauteilen in kontinuierlichen Hochfrequenz Hochleistungs DC DC Wandlern experimentell untersucht In diesem Zusammenhang wird eine Designoptimierung eines Hochfrequenztransformators vorgestellt und der Einfluss verschiedener Kernmaterialien Leiterauf hrungen und Wicklungsanordnungen wird bewertet Es wird ein unidirektionaler ZVZCS Vollbr cken DC DC Wandler

vorgestellt der nur die parasitäre Streuinduktivität des Transformators verwendet Experimentelle Ergebnisse für einen 10 kW 100 250 kHz Prototyp zeigen einen Wirkungsgrad von bis zu 98,1% für den gesamten Umrichter Abschließend wird ein optimiertes Regelverfahren verwendet welches auf einem modifizierten Dual Phase Shift Regelverfahren basiert um den Kreisstrom im isolierten bidirektionalen Dual Aktiv Brücken DC/DC Wandler zu minimieren Diese Regelmethode wird experimentell mit der herkömmlichen Single Phase Shift Regelung verglichen Hierbei zeigt sich eine deutliche Effizienzsteigerung durch die neue Regelmethode Die experimentellen Ergebnisse bestätigen die theoretische Analyse und zeigen dass die vorgeschlagene Regelung den Gesamtwirkungsgrad des Umrichters erhöhen und den ZVZCS Bereich erweitern kann

Recent Developments on Power Inverters Ali Saghaforia, 2017-06-21 This book develops some methods and structures to improve the power inverters for different applications in a single phase or three phase output in recent years The reduction of the switching devices and multilevel inverters as changing structure for the power inverters and PDM and PWM methods as changing control methods for the power inverter are studied in this book Moreover power inverters are developed to supply open ended loads Furthermore the basic and advanced aspects of the electric drives that are control based are taught for induction motor IM based on power inverters suitable for both undergraduate and postgraduate levels The main objective of this book is to provide the necessary background to improve and implement the high performance inverters Once the material in this book has been mastered the reader will be able to apply these improvements in the power inverters to his or her problems for high performance power inverters

Emerging Capabilities and Applications of Wireless Power Transfer Triviño-Cabrera, Alicia, Aguado, José A., 2018-09-21 Technologies that enable powering a device without the need for being connected with a cable to the grid are gaining attention in recent years due to the advantages that they provide They are a commodity to users and provide additional functionalities that promote autonomy among the devices Emerging Capabilities and Applications of Wireless Power Transfer is an essential reference source that analyzes the different applications of wireless power transfer technologies and how the technologies are adapted to fulfill the electrical magnetic and design based requirements of different applications Featuring research on topics such as transfer technologies circuit analysis and inductive power transfer this book is a vital resource for academicians electrical engineers scientists researchers and industry professionals seeking coverage on device power and creating autonomy through alternative power options for devices

Microwave and RF Vacuum Electronic Power Sources Richard G. Carter, 2018-04-12 Do you design and build vacuum electron devices or work with the systems that use them Quickly develop a solid understanding of how these devices work with this authoritative guide written by an author with over fifty years of experience in the field Rigorous in its approach it focuses on the theory and design of commercially significant types of gridded linear beam crossed field and fast wave tubes Essential components such as waveguides resonators slow wave structures electron guns beams magnets and collectors are also covered as well as the integration and

reliable operation of devices in microwave and RF systems Complex mathematical analysis is kept to a minimum and Mathcad worksheets supporting the book online aid understanding of key concepts and connect the theory with practice Including coverage of primary sources and current research trends this is essential reading for researchers practitioners and graduate students working on vacuum electron devices

Basics of Electrical Machines Prof. D. K. Palwalia, Dr. U. K. Kalla, Dr. R. K. Kumawat, 2025-01-01

Permanent Magnet Synchronous and Brushless DC Motor Drives Ramu Krishnan, 2017-12-19

Despite two decades of massive strides in research and development on control strategies and their subsequent implementation most books on permanent magnet motor drives still focus primarily on motor design providing only elementary coverage of control and converters Addressing that gap with information that has largely been disseminated only in journals and at conferences Permanent Magnet Synchronous and Brushless DC Motor Drives is a long awaited comprehensive overview of power electronic converters for permanent magnet synchronous machines and control strategies for variable speed operation It introduces machines power devices inverters and control and addresses modeling implementation control strategies and flux weakening operations as well as parameter sensitivity and rotor position sensorless control Suitable for both industrial and academic audiences this book also covers the simulation low cost inverter topologies and commutation torque ripple of PM brushless DC motor drives Simulation of the motor drives system is illustrated with MATLAB codes in the text This book is divided into three parts fundamentals of PM synchronous and brushless dc machines power devices inverters PM synchronous motor drives and brushless dc motor drives With regard to the power electronics associated with these drive systems the author Explores use of the standard three phase bridge inverter for driving the machine power factor correction and inverter control Introduces space vector modulation step by step and contrasts with PWM Details dead time effects in the inverter and its compensation Discusses new power converter topologies being considered for low cost drive systems in PM brushless DC motor drives This reference is dedicated exclusively to PM ac machines with a timely emphasis on control and standard and low cost converter topologies Widely used for teaching at the doctoral level and for industrial audiences both in the U S and abroad it will be a welcome addition to any engineer's library

Hybrid Electric Vehicle System Modeling and Control Wei Liu, 2017-01-24

This new edition includes approximately 30% new materials covering the following information that has been added to this important work extends the contents on Li ion batteries detailing the positive and negative electrodes and characteristics and other components including binder electrolyte separator and foils and the structure of Li ion battery cell Nickel cadmium batteries are deleted adds a new section presenting the modelling of multi mode electrically variable transmission which gradually became the main structure of the hybrid power train during the last 5 years newly added chapter on noise and vibration of hybrid vehicles introduces the basics of vibration and noise issues associated with power train driveline and vehicle vibrations and addresses control solutions to reduce the noise and vibration levels Chapter 10 chapter 9 of the first edition is

extended by presenting EPA and UN newly required test drive schedules and test procedures for hybrid electric mileage calculation for window sticker considerations In addition to the above major changes in this second edition adaptive charging sustaining point determination method is presented to have a plug in hybrid electric vehicle with optimum performance

Analysis and Comparison of Power Electronic Converters with Electronic Isolation Kazanbas,

Mehmet,2015-02-23 With the continual increase in the global energy consumption grows the demand on the power capacity efficient production distribution and utilization of the electrical energy generated The role of power electronics in such contexts has been of great importance not only for the traditional power generator systems but also for the decentralized renewable energy generation like solar and wind power Several innovations can be observed in the field of power systems for renewable energy sources based on power electronics Improvements can be identified regarding for example control techniques semiconductor devices electromagnetic components and also topologies Such developments allow specific application requirements to be fulfilled with lower levels of losses and less material expenditure In this thesis power electronic topologies are analyzed with respect to the type of electrical isolation between the input and output which may differ in three ways galvanic capacitive and electronic Among the above requirements galvanic isolation is a major issue in photovoltaic applications not only due to regulations concerning the grounding of PV modules but also because of compatibility requirements of new cell technologies Within this framework a theoretical and practical examination on new inverter topologies is investigated with electronic isolation method in order to meet the targeted future challenge aspects

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