A New Transformerless Buck With Positive Output Voltage

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Advanced Power Electronics Converters for Future Renewable Energy Systems Elsevier
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.
Proceedings of International Conference on Power Electronics and Renewable Energy Systems Springer Nature
This book comprises the proceedings of the 1st International Conference on Future Technologies in Manufacturing, Automation, Design and Energy 2020. The contents of this volume focus on recent technological advances in the field of manufacturing, automation, design and energy. Some of the topics covered include additive manufacturing, renewable energy resources, design automation, process automation and monitoring, etc. This volume will prove a valuable resource for those in academia and industry.
Intelligent Techniques and Applications in Science and Technology PHI Learning Pvt. Ltd.
This book features high-quality research papers presented at the 2nd International Conference on Intelligent Computing and Advances in Communication (ICAC 2019), held at Siksha 'O' Anusandhan Deemed to be University, Bhubaneswar, Odisha, India, in November 2019. Covering a wide variety of topics, including management of clean and smart energy systems and environmental challenges, it is a valuable resource for researchers and practicing engineers working in various fields of renewable energy generation, and clean and smart energy management.
Power Systems Research and Operation CRC Press
A comprehensive survey of advanced multilevel converter design, control, operation and grid-connected applications Advanced Multilevel Converters and Applications in Grid Integration presents a comprehensive review of the core principles of advanced multilevel converters, which require fewer components and provide higher power conversion efficiency and output power quality. The authors – noted experts in the field – explain in detail the operation principles and control strategies and present the mathematical expressions and design procedures of their components. The text examines the advantages and disadvantages compared to the classical multilevel and two level power converters. The authors also include examples of the industrial applications of the advanced multilevel converters and offer thoughtful explanations on their control strategies. Advanced Multilevel Converters and Applications in Grid Integration provides a clear understanding of the gap difference between research conducted and the current industrial needs. This important guide: Puts the focus on the new challenges and topics in related areas such as modulation methods, harmonic analysis, voltage balancing and balanced current injection Makes a strong link between the fundamental concepts of power converters and advances multilevel converter topologies and examines their control strategies, together with practical engineering considerations Provides a valid reference for further developments in the multilevel converters design issue Contains simulations files for further study Written for university students in electrical engineering, researchers in areas of multilevel converters, high-power converters and engineers and operators in power industry, Advanced Multilevel Converters and Applications in Grid Integration offers a comprehensive review of the core principles of advanced multilevel converters, with contributions from noted experts in the field.
Transformerless Photovoltaic Grid-Connected Inverters Springer Nature
This book comprises the select proceedings of the International Conference on Power Engineering Computing and Control (PECCON) 2019. This volume covers several important topics such as optimal data selection and error-free data acquiring via artificial intelligence and machine learning techniques, information and communication technologies for monitoring and control of smart grid components, and data security in smart grid network. In addition, it also focuses on economics of renewable electricity generation, policies for distributed generation, smart eco-structures and systems. This book can be useful for beginners, researchers as well as professionals interested in the area of smart grid technology.
Control and Information Sciences Springer Nature
This book narrates an assessment of numerous advanced power converters employed on primitive phase to enhance the efficiency of power translation pertaining to renewable energy systems. It presents the mathematical modelling, analysis, and control of recent power converters topologies, namely, AC/DC, DC/DC, and DC/AC converters. Numerous advanced DC-DC Converters, namely, multi-input DC-DC Converter, Cuk, SEPIC, Zeta and so forth have been assessed mathematically using state space analysis applied with an aim to enhance power efficiency of renewable energy systems. The book: Explains various power electronics converters for different types of renewable energy sources Provides a review of the major power conversion topologies in one book Focuses on experimental analysis rather than simulation work Recommends usage of MATLAB, PSCAD, and PSIM simulation software for detailed analysis Includes DC-DC converters with reasonable peculiar power rating This book is aimed at researchers, graduate students in electric power engineering, power and industrial electronics, and renewable energy.
Design and Control of Power Converters 2020 Springer Nature
This two-volume set (CCIS 905 and CCIS 906) constitutes the refereed proceedings of the Second International Conference on Advances in Computing and Data Sciences, ICACDS 2018, held in Dehradun, India, in April 2018. The 110 full papers were carefully reviewed and selected from 598 submissions. The papers are centered around topics like advanced computing, data sciences, distributed systems organizing principles, development frameworks and environments, software verification and validation, computational complexity and cryptography, machine learning theory, database theory, probabilistic representations.
Advances in Electrical and Computer Technologies Springer Nature
This book features selected high-quality papers from the International Conference on Innovation in Electrical Power Engineering, Communication, and Computing Technology (IEPCCT 2019), held at Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, India, on 13–14 December 2019. Presenting innovations in power, communication, and computing, it covers topics such as mini, micro, smart and future power grids; power system economics; energy storage systems; intelligent control; power converters; improving power quality; signal processing; sensors and actuators; image/video processing; high-performance data mining algorithms; advances in deep learning; and optimization methods.
Power Electronic Converters for Solar Photovoltaic Systems Springer Nature
Due to the increasing world population, energy consumption is steadily climbing, and there is a demand to provide solutions for sustainable and renewable energy production, such as wind turbines and photovoltaics. Power electronics are being used to interface renewable sources in order to maximize the energy yield, as well as smoothly integrate them within the grid. In many cases, power electronics are able to ensure a large amount of

energy saving in pumps, compressors, and ventilation systems. This book explains the operations behind different renewable generation technologies in order to better prepare the reader for practical applications. Multiple chapters are included on the state-of-the-art and possible technology developments within the next 15 years. The book provides a comprehensive overview of the current renewable energy technology in terms of system configuration, power circuit usage, and control. It contains two design examples for small wind turbine system and PV power system, respectively, which are useful for real-life installation, as well as many computer simulation models.

Coordination and Control of Power Converters in Modern Power Systems CRC Press

This thoroughly revised text, now in its third edition, continues to provide a detailed discussion on all the aspects of solar photovoltaic (PV) technologies from physics of solar cells to manufacturing technologies, solar PV system design and their applications. The Third Edition includes a new chapter on “Advances in c-Si Cell Processes Suitable for Near Future Commercialization” (Chapter 8) to introduce the technological advancement in the commercial production to keep the readers up to date. Organized in three parts, Part I introduces the fundamental principles of solar cell operation and design, Part II explains various technologies to fabricate solar cells and PV modules and Part III focuses on the use of solar photovoltaics as part of the system for providing electrical energy. In addition to this, numerous chapter-end exercises are given to reinforce the understanding of the subject. The text is intended for the undergraduate and postgraduate students of engineering for their courses on solar photovoltaic technologies and renewable energy technologies. The book is of immense use for teachers, researchers and professionals working in the photovoltaic field. In a nutshell, this book is an absolute must-read for all those who want to understand and apply the basics behind photovoltaic devices and systems.

Innovation in Electrical Power Engineering, Communication, and Computing Technology Springer Nature

A new photovoltaic (PV) array power converter circuit is presented. The salient features of this inverter are: transformerless topology, grounded PV array, and only film capacitors. The motivations are to reduce cost, eliminate leakage ground currents, and improve reliability. The use of Silicon Carbide (SiC) transistors is the key enabling technology for this particular circuit to attain good efficiency. Traditionally, grid connected PV inverters required a transformer for isolation and safety. The disadvantage of high frequency transformer based inverters is complexity and cost. Transformerless inverters have become more popular recently, although they can be challenging to implement because of possible high frequency currents through the PV array's stay capacitance to earth ground. Conventional PV inverters also typically utilize electrolytic capacitors for bulk power buffering. However such capacitors can be prone to decreased reliability. The solution proposed here to solve these problems is a bi directional buck boost converter combined with half bridge inverters. This configuration enables grounding of the array's negative terminal and passive power decoupling with only film capacitors. Several aspects of the proposed converter are discussed. First a literature review is presented on the issues to be addressed. The proposed circuit is then presented and examined in detail. This includes theory of operation, component selection, and control systems. An efficiency analysis is also conducted. Simulation results are then presented that show correct functionality. A hardware prototype is built and experiment results also prove the concept. Finally some further developments are mentioned. As a summary of the research a new topology and control technique were developed. The resultant circuit is a high performance transformerless PV inverter with upwards of 97% efficiency.

Solar Power and Energy Storage Systems Frontiers Media SA

Advances in Grid-Connected Photovoltaic Power Conversion Systems addresses the technological challenges of fluctuating and unreliable power supply in grid-connected photovoltaic (PV) systems to help students, researchers, and engineers work toward more PV installations in the grid to make society more sustainable and reliable while complying with grid regulations. The authors combine their extensive knowledge and experience in this book to address both the basics of the power electronic converter technology and the advances of such practical electric power conversion systems. This book includes extensive, step-by-step practical application examples to assist students and engineers to better understand the role of power electronics in modern PV applications and solve the practical issues in grid-connected PV systems. - Offers a step-by-step modeling approach to solving the practical issues and technological challenges in grid-connected PV systems - Provides practical application examples to assist the reader to better understand the role of power electronics in modern PV applications - Extends to the most modern technologies for grid-friendly PV systems

Power Electronics Converters and their Control for Renewable Energy Applications MDPI

This book studies switch-mode power supplies (SMPS) in great detail. This type of converter changes an unregulated DC voltage into a high-frequency pulse-width modulated (PWM) voltage controlled by varying the duty cycle, then changes the PWM AC voltage to a regulated DC voltage at a high efficiency by rectification and filtering. Used to supply electronic circuits, this converter saves energy and space in the overall system. With concept-orientated explanations, this book offers state-of-the-art SMPS technology and promotes an understanding of the principle operations of PWM converters, as well as enabling the readers to evaluate their characteristics. Design-orientated analysis (including a steady-state analysis for both continuous and discontinuous conduction modes) and numerous real-world practical examples (including circuit models of the PWM converters) demonstrate how to design these from scratch. The book provides an in-depth presentation of topologies of PWM DC-DC power converters, voltage- and current-mode control of PWM DC–DC power converters, considers power losses in all components, device stresses, output voltage ripple, converter efficiency and power factor correction (PFC). It also includes extensive coverage of the following: topologies of high-efficiency switching-mode PWM and soft-switching DC-DC power converters; DC voltage transfer functions (conversion ratios), component values, losses, efficiency, and stresses; small-signal averaged circuit models; current-mode and voltage-mode feedback controls; metal-oxide-semiconductor field-effect power transistors (MOSFETs); silicon (Si) and silicon carbide (SiC) power semiconductor devices. Before now, there has been no book that covers silicon carbide devices. Pulse-width Modulated DC-DC Power Converters is a comprehensive textbook for senior undergraduate and graduate students in the areas of electrical, electronics, and telecommunications engineering. It includes end-of-chapter review questions, problems, and thorough summaries of the key concepts to aid learning, and a Solutions Manual is available for professors. Scientists and practicing design engineers working with SMPS, within such applications as computers, telecommunications, industrial systems, automobile electronics, medical equipment, aerospace power technology, and radars (amongst others) will also find this text insightful.

Solar Photovoltaics Frontiers Media SA

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.

Renewable Energy Devices and Systems with Simulations in MATLAB® and ANSYS® Springer Nature

Continuous cost reduction of photovoltaic (PV) systems and the rise of power auctions resulted in the establishment of PV power not only as a green energy source but also as a cost-effective solution to the electricity generation market. Various commercial solutions for grid-connected PV systems are available at any power level, ranging from multi-megawatt utility-scale solar farms to sub-kilowatt residential PV installations. Compared to utility-scale systems, the feasibility of small-scale residential PV installations is still limited by existing technologies that have not yet properly address issues like operation in weak grids, opaque and partial shading, etc. New market drivers such as warranty improvement to match the PV module lifespan, operation voltage range extension for application flexibility, and embedded energy storage for load shifting have again put small-scale PV systems in the spotlight. This Special Issue collects the latest developments in the field of power electronic converter topologies, control, design, and optimization for better energy yield, power conversion efficiency, reliability, and longer lifetime of the small-scale PV systems. This Special Issue will serve as a reference and update for academics, researchers, and practicing engineers to inspire new research and developments that pave the way for next-generation PV systems for residential and small commercial applications.

DC—DC Converters for Future Renewable Energy Systems Springer Nature

This book focuses on a safety issue in terms of leakage current, builds a common-mode voltage analysis model for TLIs at switching frequency scale and develops a new modulation theory referred as “Constant Common-Mode Voltage Modulation” to eliminate the leakage current of TLIs. Transformerless Grid-Connected Inverter (TLI) is a circuit interface between photovoltaic arrays and the utility, which features high conversion efficiency, low cost, low volume and weight. The detailed theoretical analysis with design examples and experimental validations are presented from full-bridge type, half-bridge type and combined topologies. This book is essential and valuable reference for graduate students and academics majored in power electronics; engineers engaged in developing distributed grid-connected inverters; senior undergraduate students majored in electrical engineering and automation engineering.

Recent Advances in Manufacturing, Automation, Design and Energy Technologies Woodhead Publishing

Power Electronics and Applications Design and Optimization of Power Electronics Converters Power Quality, EMC, Filtering and PFC Technical Requirements and Challenges Power Electronics for Renewable Energy Systems Power Electronics in Electrical Energy, Generation, Transmission, and Distribution Power Supplies New Converter Topologies New Industrial Applications of Power Electronics Converters Control of Power Converters Electrical Drives Fault Tolerant Design of Power Electronics Converters Battery Chargers Wireless Power Transmissions Machine Design and Drives Motors and Drives for Electrified Transportation High Power AC Drives Applications of Power Electronics Converters in Smart Grids Power Semiconductor Devices Reliability of Power Electronics Converters

Machine Learning, Advances in Computing, Renewable Energy and Communication Academic Press

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.

Pulse-width Modulated DC-DC Power Converters John Wiley & Sons

Power Electronics Converters and their Control for Renewable Energy Applications provides information that helps to solve common challenges with power electronics converters, including loss by switching, heating of power switches, management of switching time, improvement of the quality of the signals delivered by power converters, and improvement of the quality of energy produced by renewable energy sources. This book is of interest to academics, researchers, and engineers in renewable energy, power systems, electrical engineering, electronics, and mechanical engineering. - Includes important visual illustrations and imagery of concise circuit schematics and renewable energy applications - Features a templated approach for step-by-step implementation of the new MPPT algorithm based on recent and intelligent techniques - Provides methods for optimal harnessing of energy from renewable energy sources and converter topology synthesis

Advances in Smart Grid Technology Springer Nature

This book comprises select proceedings of the International Conference on Advances in Electrical and Computer Technologies 2021 (ICAECT 2021). The papers presented in this book are peer-reviewed and cover the latest research in electrical, electronics, communication, and computer engineering. Topics covered include smart grids, soft computing techniques in power systems, smart energy management systems, power electronics, feedback control systems, biomedical engineering, geographic information systems, grid computing, data mining, image and signal processing, video processing, computer vision, pattern recognition, cloud computing, pervasive computing, intelligent systems, artificial intelligence, neural network and fuzzy logic, broadband communication, mobile and optical communication, network security, VLSI, embedded systems, optical networks, and wireless communication. The book is useful for students and researchers working in the different overlapping areas of electrical, electronics, and communication engineering.

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