

Wireless Power Transfer

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focusing on inductive wireless power transfer wpt which relies on coil resonators and power converters this book begins by providing the background and basic theories

of wpt which are essential for newcomers to the field then two major challenges of wpt power transfer distance and efficiency are subsequently addressed and multi resonator wpt systems which not only offer a way to extend power transfer distance but also provide more flexibility are investigated recent findings on techniques to maximize the power transfer efficiency of wpt systems e g maximum efficiency point tracking are also introduced without the constraint of cables wireless power transfer wpt is an elegant technique for charging or powering a range of electrical devices e g electric vehicles mobile phones artificial hearts etc given its depth of coverage the book can serve as a technical guideline or reference guide for engineers and researchers working on wpt

this book is a printed edition of the special issue control of energy storage that was published in energies

wireless power transfer wpt is a promising technology used to transfer electric energy from a transmitter to a receiver wirelessly without wires through various methods and technologies using time varying electric magnetic or electromagnetic fields it is an attractive solution for many industrial applications due to its many benefits over wired connections this book discusses the theory and practical aspects of wpt technology

the book is an excellent foundation for applying wireless energy transfer technologies in most fields including transportation communication home automation biomedical systems and home appliances

a very unique book that integrates benefits of modular systems for enhanced sustainability to meet the global challenges of rapid and sometimes uncontrolled industrialization in the 21st century pinakin patel t2m global this book examines the role of the modular approach for the back end of the energy industry energy usage management it outlines the use of modular approaches for the processes used to improve energy conservation and efficiency which are preludes to the prudent use of energy since energy consumption is conventionally broken down into four sectors residential transportation industrial and commercial the discussions on energy usage management are also broken down into these four sectors in the book the book examines the use of modular systems for five application areas that cover the sectors described above buildings vehicles computers and electrical electronic products district heating and wastewater treatment and desalination this book also discusses the use of a modular approach for energy storage and transportation finally it describes how the modular approach facilitates bottom up top down and hybrid simulation and modeling of the energy systems from various scientific and socioeconomic perspectives aimed at industry professionals and researchers involved in the energy industry this book illustrates in detail with the help of concrete industrial examples how a modular approach can facilitate management of energy usage

this accessible guide describes the design and implementation of new front end monitoring and control strategies for wireless power transfer wpt the new control paradigm moves all receiver side controllers to the transmitter side to enable multiple advantages over conventional designs self commissioning wireless power transfer a new control paradigm provides readers with information in three areas first it discusses a series of front end monitoring and control strategies for wpt the new technologies are designed at the transmitter side while no control is needed at the receiver side in addition no communication is required between the transmitter and the receiver implementing this change will enable engineers to make the receiver more compact reliable and cost effective and enhance the overall efficiency of the system as the main power circuits of the wpt system auxiliary power supplies of controllers and protection circuits can be significantly reduced second it presents designs for new control strategies in achieving maximum efficiency transfer and minimum charging time along with precise modeling of battery loads and other power electronic components throughout the charging process third it illustrates how new control methodologies integrate with other technologies for compatibility in industrial applications throughout this book illustrates its descriptions of the technologies and designs with real world case studies and analysis researchers working on wpt technologies in academia and industry will benefit immensely from the discussions presented in this book graduate students aiming to increase their knowledge on control schemes for power converters at the transmitter side and primary side control for transmitter side inverters will also find it valuable

this book presents select proceedings of the international conference on green energy computing and intelligent technology gen city 2023 held at the university of southampton malaysia in july 2023 this book primarily covers clean energy and intelligent technologies for a sustainable future this book serves as a forum for engineers researchers and specialists from academia research centers and industry worldwide to discuss and present the latest developments and applications related to the challenges of securing green and clean energy sources for the 21st century to protect the environment

wireless power transfer for e mobility fundamentals and design guidelines for wireless charging of electric vehicles provides a comprehensive resource for researchers and engineers engaged in the development of automotive wpt systems the book opens with an overview of wireless technologies for power transfer and their evolution over time then focusing on the application of this technology to electric mobility highlighting its importance in terms of impact and perspectives on the development of sustainable transport and autonomous driving chapters discuss the fundamentals of electromagnetic field in wpt systems and the circuit modelling in addition they examine core current electric vehicle systems and present day automotive wpt standards design techniques of magnetic couplers including compensation networks are explored in depth alongside power electronics techniques for automotive wpt systems both stationary and dynamic automotive wpt systems are rigorously assessed

finally the problems of electromagnetic compatibility and electromagnetic field safety are described with particular attention to shielding techniques for the mitigation of magnetic field emissions addressing essential knowledge from foundational to advanced levels wireless power transfer for e mobility provides practical guidance to engineers and researchers developing the future of electric mobility provides an advanced foundation for research and current industrial applications in automotive wpt systems develops proven methodologies linked to some case studies using examples drawn from global practice explores the role of wpt in near future mobility scenarios with featured coverage of electrified transportation includes an extensive usage of equations from matlab spice and comsol

a guide to the theory and recent development in the medical use of antenna technology antenna and sensor technologies in modern medical applications offers a comprehensive review of the theoretical background design and the latest developments in the application of antenna technology written by two experts in the field the book presents the most recent research in the burgeoning field of wireless medical telemetry and sensing that covers both wearable and implantable antenna and sensor technologies the authors review the integrated devices that include various types of sensors wired within a wearable garment that can be paired with external devices the text covers important developments in sensor integrated clothing that are synonymous with athletic apparel with built in electronics information on implantable devices is also covered the book explores technologies that utilize both inductive coupling and far field propagation these include minimally invasive microwave ablation antennas wireless targeted drug delivery and much more this important book covers recent developments in wireless medical telemetry reviews the theory and design of in vitro in vivo testing explores emerging technologies in 2d and 3d printing of antenna sensor fabrication includes a chapter with an annotated list of the most comprehensive and important references in the field written for students of engineering and antenna and sensor engineers antenna and sensor technologies in modern medical applications is an essential guide to understanding human body interaction with antennas and sensors

this book describes systematically wireless power transfer technology using magnetic resonant coupling and electric resonant coupling and presents the latest theoretical and phenomenological approaches to its practical implementation operation and its applications it also discusses the difference between electromagnetic induction and magnetic resonant coupling the characteristics of various types of resonant circuit topologies and the unique features of magnetic resonant coupling methods designed to be self contained this richly illustrated book is a valuable resource for a broad readership from researchers to engineers and anyone interested in cutting edge technologies in wireless power transfer

wireless power transfer presents a detailed overview of multiple objective wireless power transfer wpt technologies including the latest research developments and

emerging applications wireless power transfer principles and applications offers comprehensive coverage of all key aspects of wireless power transfer wpt technologies including fundamental theory intelligent control configuration analysis and emerging power electronics techniques this unique resource is the first book of its kind to provide in depth discussion of energy transmission control schemes with emphasis on omni directional vector control energy encryption based security control demand based optimal designs for transmitter pickup and self resonance coils multiple objective power distribution and maximum efficiency and power control under various conditions in addition this text presents the methodologies and approaches of emerging multiple objective wpt technologies discusses various applications for wireless charging techniques including contactless power for electric vehicles in flight charging for unmanned aerial vehicles and underwater wireless charging covers both intermittent and continuous impedance matching methods for different classes of coils features more than 400 high quality illustrations and numerous figures and tables throughout wireless power transfer principles and applications is an invaluable technical reference for academic researchers and industry professionals in power and energy engineering and an excellent textbook for postgraduate courses in relevant areas of industrial and electronic engineering

what is wireless power transfer the transmission of electrical energy in the absence of cables as a physical connection is referred to variously as wireless power transfer wpt wireless power transmission wpt wireless energy transmission wet or electromagnetic power transfer ept in a system for wirelessly transmitting power a transmitter device is propelled by electric power derived from a power source this drives the device to generate a time varying electromagnetic field which in turn transmits power across space to a receiver device the receiver device then extracts power from the field and supplies it to an electrical load by removing the need for cables and batteries the technology of wireless power transfer may increase the portability convenience and safety of an electronic gadget for all of its users it is helpful to employ wireless power transmission in order to power electrical equipment in situations where physically connecting cables would be difficult harmful or otherwise impossible how you will benefit i insights and validations about the following topics chapter 1 wireless power transfer chapter 2 microwave chapter 3 electromagnetic compatibility chapter 4 antenna radio chapter 5 klystron chapter 6 near and far field chapter 7 index of electronics articles chapter 8 resonator chapter 9 spark gap transmitter chapter 10 loop antenna chapter 11 index of electrical engineering articles chapter 12 grid dip oscillator chapter 13 coupling electronics chapter 14 inductive charging chapter 15 dielectric resonator antenna chapter 16 wrel technology chapter 17 resonant inductive coupling chapter 18 qi standard chapter 19 magnetoquasistatic field chapter 20 glossary of electrical and electronics engineering chapter 21 history of the tesla coil ii answering the public top questions about wireless power transfer iii real world examples for the usage of wireless power transfer in many fields iv 17 appendices to explain briefly 266 emerging technologies in each industry to have 360 degree full understanding of wireless power transfer technologies who this book is for professionals undergraduate and graduate students enthusiasts hobbyists and those who

want to go beyond basic knowledge or information for any kind of wireless power transfer

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

this book describes the fundamentals and applications of wireless power transfer wpt in electric vehicles evs wireless power transfer wpt is a technology that allows devices to be powered without having to be connected to the electrical grid by a cable electric vehicles can greatly benefit from wpt as it does away with the need for users to manually recharge the vehicles batteries leading to safer charging operations some wireless chargers are available already and research is underway to develop even more efficient and practical chargers for evs this book brings readers up to date on the state of the art worldwide in particular it provides the fundamental principles of wpt for the wireless charging of electric vehicles car bicycles and drones including compensation topologies bi directionality and coil topologies information on international standards for ev wireless charging design procedures for ev wireless chargers including software files to help readers test their own designs guidelines on the components and materials for ev wireless chargers review and analysis of the main control algorithms applied to ev wireless chargers review and analysis of commercial ev wireless charger products coming to the market and the main research projects on this topic being carried out worldwide the book provides essential practical guidance on how to design wireless chargers for electric vehicles and supplies matlab files that demonstrate the complexities of wpt technology and which can help readers design their own chargers

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