Design of a Permanent Magnet Synchronous Generator for A

There is a growing number of applications that require fast-rotating machines; motivation for this thesis comes from a project in which downsized spindles for micro-machining have been researched. The thesis focuses on analysis and design of high-speed PM machines and uses a practical design of a high-speed spindle drive as a test case. Phenomena, both mechanical and electromagnetic, that take precedence in high-speed permanent magnet machines are identified and systematized. The thesis identifies inherent speed limits of permanent magnet machines and correlates those limits with the basic parameters of the machines. The analytical expression of the limiting quantities does not only impose solid constraints on the machine design, but also creates the way for design optimization leading to the maximum mechanical and/or electromagnetic utilization of the machine. The models and electric-drive concepts developed in the thesis are evaluated in a practical setup.

Design of Brushless Permanent-magnet Motors

Design and Control of a New Class of Doubly Salient Permanent Magnet Machines

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Design of Permanent Magnet Synchronous Motor (PM SM) Using Femm

Permanent Magnet Motor Technology

Brushless Permanent-magnet Motor Design

Brushless Motors: Magnetic Design, Performance and Control is an outgrowth of the author's two previous books on this subject. This book contains significant additional material covering further aspects of magnetic design, performance, and electrical control. The primary goal of this book is to meet the needs of working engineers who have little or no experience in electric motor design and control. The book starts with basic concepts, provides intuitive reasoning for them, and gradually builds a set of understandable concepts that foster the development of usable knowledge. This book strives to provide a basis of knowledge that non-experts can use to develop practical expertise, making them more productive in their work and allowing them to productively explore other approaches to motor design, performance, and electrical control.

Permanent Magnet and Electromechanical Devices
Permanent Magnet Materials and their Application

Electric Machines for Smart Grids Applications

Permanent Magnet Design

Commences with a review of the fundamental concepts of magnetostatics and the analysis of solutions to problems in simple geometries, followed by the design of magnetic structures. The third section analyzes two major aspects of the magnetic structures and demagnetization properties of actual magnetic material. Offers a number of practical uses for permanent magnets, particularly to Magnetic Resonance Imaging and also includes industrial machinery, high energy accelerators and free electron lasers.

Power Magnetic Devices

This book describes the design of the first functioning single-sided tomograph, the related measurement methods, and a number of applications in medicine, materials science, and chemical engineering. It will be the first comprehensive account of this new device and its applications. Among the key advances of this method is that images can be obtained in much shorter times than originally anticipated, and that even vector maps of flow fields can be measured although the magnetic fields are highly inhomogeneous. Furthermore, the equipment is small, mobile and affordable to small and medium enterprises and can be located in doctors’ offices.

Permanent Magnet Motor Design

Design of Brushless Permanent-magnet Machines

This book is a comprehensive design text on permanent magnets and their applications. The author begins with a brief overview of the theory of magnetism and explains the behavior of the different classes of permanent magnets and the various production processes that lead to quite diverse material characteristics. The core of the book is a detailed treatment of the methods used to design permanent magnets, including assessments of the changes they experience under practical operating conditions. The volume also describes modern analytical techniques including the finite element method, with reference to the accurate simulation of permanent magnetic materials. Electrical engineers, condensed matter physicists and materials scientists will find this book useful.

Permanent Magnet Materials and their Application

An Investigation of the Theory and Design of a Permanent Magnet Alternator with Interpolar Magnetic Shunts

Interest in permanent magnet synchronous machines (PMSMs) is continuously increasing worldwide, especially with the increased use of renewable energy and the electrification of transports. This book contains the successful submissions of fifteen papers to a Special Issue of Energies on the subject area of “Permanent Magnet Synchronous Machines”. The focus is on permanent magnet synchronous machines and the electrical systems they are connected to. The presented work represents a wide range of areas. Studies of control systems, both for permanent magnet synchronous machines and for brushless DC motors, are presented and experimentally verified. Design studies of generators for wind power, wave power and hydro power are presented. Finite element method simulations and analytical design methods are used. The presented studies represent several of the different research fields on permanent magnet machines and electric drives.

Summary of Useful Relationships in the Design and Testing of Permanent Magnets

This dissertation, "Design, Analysis and Control of Doubly Salient Permanent Magnet Motor Drives" by Ming, Cheng,
Design of a Permanent Magnet Generator for a Sustainable Wind Energy Capture and Storage System

This book introduces and illustrates modeling, sensing, and control methods for analyzing, designing, and developing spherical motors. It systematically presents models for establishing the relationships among the magnetic fields, position/orientation and force/torque, while also providing time-efficient solutions to assist researchers and engineers in studying and developing these motors. In order to take full advantage of spherical motors' compact structure in practical applications, sensing and control methods that utilize their magnetic fields and eliminate the need to install external sensors for feedback are proposed. Further, the book investigates for the first time spherical motors' force/torque manipulation capability, and proposes algorithms enabling the ball-joint-like end-effector for haptic use based on these motors' hybrid position/force actuation modes. While systematically presenting approaches to their design, sensing and control, the book also provides many examples illustrating the implementation issues readers may encounter.

Single-Sided N M R

Several alternative designs for a magnetron/gyrotron, permanent magnet solenoid are analyzed with regard to magnetic field uniformity and magnitude, structural weight, susceptibility to heating, and access hole size. Structural masses were found to range from about 10 kilograms to 60 kilograms depending on details of design and or the type of permanent magnet tube. Recommendations are made as to the best choices for the intended purpose Permanent-magnet solenoids, Magnetrons, Gyrotrons, Magnetic cladding, Azimuthal dependence of field.

India Today and Tomorrow Series

G e r a m i c P e r m a n e n t-m a g n e t M e t e r s

Co-authored by a world-renowned expert in the field, Permanent Magnet Motor Technology: Design and Applications, Second Edition demonstrates the construction of PM motor drives and supplies ready-to-implement solutions for common roadblocks. The author presents fundamental equations and calculations to determine and evaluate system performance, efficiency, and reliability; explores modern computer-aided design of PM motors, including the finite element approach; and covers how to select PM motors to meet the specific requirements of electrical drives. The numerous examples, models, and diagrams provided in each chapter give the reader a clear understanding of motor operations and characteristics.

P e r m a n e n t M a g n e t s a n d M a g n e t i s m

Design Considerations for Salient Pole, Permanent Magnet Synchronous Motors in Variable Speed Drive Applications

Magnets are widely used in industry, medical, scientific instruments, and electrical equipment. They are the basic tools for scientific research and electromagnetic devices. Numerical methods for the magnetic field analysis combined with mathematical optimization from practical applications of the magnets have been widely studied in recent years. It is necessary for professional researchers, engineers, and students to study these numerical methods for the complex magnet structure design instead of using traditional “trial-and-error” methods. Those working in this field will find this book useful as a reference to help reduce costs and obtain good magnetic field quality. Presents a clear introduction to magnet technology, followed by basic theories, numerical analysis, and practical applications Emphasizes the latest developments in magnet design, including MRI systems Provides comprehensive numerical techniques that provide solutions to practical problems Introduces the latest computation techniques for optimizing and characterizing the magnetostatic structure design Well organized and adaptable by researchers, engineers, lecturers, and students Appendix available on the Wiley Companion Website As a comprehensive treatment of the topic, Practical Design of Magnetostatic Structure Using Numerical Simulation is ideal for researchers in the field of magnets and their applications, materials scientists,
structural engineers, and graduate students in electrical engineering. The book will also better equip mechanical engineers and aerospace engineers.

Design, Analysis and Control of Doubly Salient Permanent Magnet Motor Drives

Practical Design of Magnetostatic Structure Using Numerical Simulation

Presents a multi-objective design approach to the many powermagnetic devices in use today Power Magnetic Devices: A Multi-Objective Design Approach addresses the design of power magnetic devices— including inductors, transformers, electromagnets, and rotating electromachinery— using a structured design approach based on formalsingle- and multi-objective optimization. The book opens with a discussion of evolutionary-computing-based optimization. Magnetic analysis techniques useful to the design of all the devices considered in the book are then set forth. This material is then used for inductor design so readers can start the design process. Core loss is next considered; this material is used to support transformer design. A chapter on force and torque production feeds into a chapter on electromagnet design. This is followed by chapters on rotating machinery and the design of a permanent magnet AC machine. Finally, enhancements to the design process including thermal analysis and AC conductor losses due to skin and proximity effects are set forth.

Power Magnetic Devices: Focuses on the design process as it relates to power magnetic devices such as inductors, transformers, electromagnets, and rotating machinery. Offers a structured design approach based on single- and multi-objective optimization. Helps experienced designers take advantage of new techniques which can yield superior designs with less engineering time. Provides numerous case studies throughout the book to facilitate readers' comprehension of the analysis and design process. Includes Powerpoint-slide-based student and instructor lecture notes and MATLAB-based examples, toolboxes, and design codes. Designed to support the educational needs of students. Power Magnetic Devices: A Multi-Objective Design Approach also serves as a valuable reference tool for practicing engineers and designers. MATLAB examples are available via the book support site.

Permanent Magnet Design and Application Handbook

This book is a comprehensive design text for permanent magnets and their application. Permanent magnets are very important industrially, and are widely used in a variety of applications, including industrial drives, consumer products, computers, and cars. In the early 1970s a new class of magnet - the rare earths - was discovered, the properties of which showed sustained improvement over the following two decades. New materials such as these have spawned many new markets for magnets, with significant performance gains in the devices for which they are used. Until now, however, there has been no text that unified all the relevant information on the wide range of modern permanent magnet materials. This book is a comprehensive review of the technology, intended for scientists and engineers involved in all stages of the manufacture, design and use of magnets.

Permanent Magnet Synchronous Machines

"A comprehensive and self-contained exposition of the theory and methods used in the analysis and design of permanent magnet and electromechanical devices." -- Back cover.

Design of High-perveance Confined-flow Guns for Periodic-permanent-magnet-focused Tubes

Design of the AC Permanent Magnet Machine

Use of Permanent Magnets in Magnetron Design

The Electromagnetic Design of a Permanent Magnet Based Separator

In this book, highly qualified scientists present their recent research motivated by the importance of electric machines. It addresses advanced studies for high-speed electrical machine design, mechanical design of rotors with surface-mounted permanent magnets, design of motor drive for brushless DC motor, single-phase motors for household applications, battery electric propulsion systems for competition racing applications, robust diagnosis by observer using the bond graph approach, a DC motor simulator based on virtual instrumentation, start-up of a PID fuzzy logic embedded control system.
for the speed of a DC motor using LabVIEW, advanced control of the permanent magnet synchronous motor and optimization of fuzzy logic controllers by particle swarm optimization to increase the lifetime in power electronic stages.

Permanent Magnet Spherical Motors

Design and Analysis of a Slotless Permanent Magnet Motor

Brushless permanent-magnet motors provide simple, low maintenance, and easily controlled mechanical power. Written by two leading experts on the subject, this book offers the most comprehensive guide to the design and performance of brushless permanent-magnetic motors ever written. Topics range from electrical and magnetic design to materials and control. Throughout, the authors stress both practical and theoretical aspects of the subject, and relate the material to modern software-based techniques for design and analysis. As new magnetic materials and digital power control techniques continue to widen the scope of the applicability of such motors, the need for an authoritative overview of the subject becomes ever more urgent. Design of Brushless Permanent-Magnet Motor fits the bill and will be read by students and researchers in electric and electronic engineering.

Structures of Permanent Magnets

Electrical Machines

The importance of permanent magnet (PM) motor technology and its impact on electromechanical drives has grown exponentially since the publication of the bestselling second edition. The PM brushless motor market has grown considerably faster than the overall motion control market. This rapid growth makes it essential for electrical and electromechanical engineers and students to stay up-to-date on developments in modern electrical motors and drives, including their control, simulation, and CAD. Reflecting innovations in the development of PM motors for electromechanical drives, Permanent Magnet Motor Technology: Design and Applications, Third Edition demonstrates the construction of PM motor drives and supplies ready-to-implement solutions to common roadblocks along the way. This edition supplies fundamental equations and calculations for determining and evaluating system performance, efficiency, reliability, and cost. It explores modern computer-aided design of PM motors, including the finite element approach, and explains how to select PM motors to meet the specific requirements of electrical drives. The numerous examples, models, and diagrams provided in each chapter facilitate a lucid understanding of motor operations and characteristics. This 3rd edition of a bestselling reference has been thoroughly revised to include: Chapters on high speed motors and micromotors Advances in permanent magnet motor technology Additional numerical examples and illustrations An increased effort to bridge the gap between theory and industrial applications Modified research results

The growing global trend toward energy conservation makes it quite possible that the era of the PM brushless motor drive is just around the corner. This reference book will give engineers, researchers, and graduate-level students the comprehensive understanding required to develop the breakthroughs that will push this exciting technology to the forefront.

Ceramic Permanent-magnet Motors

Design and Operation of Permanent Magnet Machine for Integrated Starter-generator Application in Series Hybrid Bus

Design of a Permanent Magnet Motor and a Drive for Cranking Purposes

Brushless Motors

Permanent Magnet Motor Technology

Brushless permanent-magnet motors provide simple, low maintenance, and easily controlled mechanical power. Written by two leading experts on the subject, this book offers the most comprehensive guide to the design and performance of
brushless permanent-magnetic motors ever written. Topics range from electrical and magnetic design to materials and control. Throughout, the authors stress both practical and theoretical aspects of the subject, and relate the material to modern software-based techniques for design and analysis. As new magnetic materials and digital power control techniques continue to widen the scope of the applicability of such motors, the need for an authoritative overview of the subject becomes ever more urgent. Design of Brushless Permanent-Magnet Motors fits the bill and will be read by students and researchers in electric and electronic engineering.

Limits, Modeling and Design of High-Speed Permanent Magnet Machines

Written for electrical, electronics, & mechanical engineers responsible for designing & specifying motors, the book provides details of brushless DC & synchronous motors, as well as both radial & axial motor topologies. Beginning with a discussion of the fundamentals of generic motor design, it logically progresses to a set of more advanced, yet easily understandable, concepts for designing brushless permanent-magnet motors. In addition, the author fully explains techniques for magnetic modeling & circuit analysis, shows how magnetic circuit analysis applies to motor design, describes all major aspects of motor operation & design in simple mathematical terms, develops rigorous design equations for radial flux & axial flux motors, & illustrates basic motor drive schemes. All common motor design terms are clearly defined & a wealth of charts, tables & equations are included.

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