Pmsm Matlab Simulink Thesis

As recognized, adventure as competently as experience not quite lesson, amusement, as with ease as promise can be gotten by just checking out a book **Pmsm Matlab Simulink Thesis** then it is not directly done, you could assume even more roughly this life, in relation to the world.

We manage to pay for you this proper as well as simple habit to acquire those all. We pay for Pmsm Matlab Simulink Thesis and numerous books collections from fictions to scientific research in any way. among them is this Pmsm Matlab Simulink Thesis that can be your partner.

WATTS JAMARI

Maximum Torque Per Ampere (MTPA) Control for Permanent Magnet Synchronous Machine Drive System John Wiley & Sons
This study is about the modeling and control of permanent magnet synchronous motors which are prime candidates for direct drive applications, due to their characteristics like high torque over a wide speed range, high

acceleration/deceleration and high torqe/intertia ratio. Direct drive applications solve problems like backlash, friction and coupling effects, but as a result the filtering effect on torque ripple is also lost which may give rise to undesirable performance in robotics. Thus initially in this thesis, the modeling of the PMSM is done to include the space harmonics which give rise to torque ripple. First, past studies on torque ripple suppression are reviewed and new and more efficient methods are presented, offering more generality and flexibility of control. Assuming these methods first, the adaptive model folowing control of PMSM is studied and simulated on a single link manipulator to demonstrate theimproved performance of the system in terms of tracking error and torque ripple suppression. Then, simulation results are obtained for an adaptive feedback linearization scheme developed for the smooth motion of a single link manipulator, using parameter identification. Next, experimental results are obtained for the position control of PMSM using conventional PID, optimal and adaptive control. The test stand is arranged to simulate a single link manipulator with varying inertia and it has been noted that the adaptive control method gives the overall best system responses in terms of error convergence. However, with this control scheme no parameter convergence has been achieved. Thus, in the final part of the thesis simulation results are given using the same adaptive control method but for a persistently exciting reference

signal instead of the previous critically damped one and parameter convergence is obtained, as expected.

Modelling, Simulation and Analysis of Low-cost Direct Torque Control of PMSM Using Hall-effect Sensors

Springer Nature

This book focuses on pulsed alternators design and applications. Both principles and design methods have been addressed. This is achieved by providing in-depth study on a number of major topics such as electrical design, thermal management, mechanical analysis, and special application. The research results and practical experience accumulated in the preliminary research, the National Natural Science Foundation of China and other major cooperative projects. Taking the pulse alternator as the core component, the entire pulse alternator system is systematically introduced, including the electromagnetic design, thermal management analysis, mechanical performance analysis of the pulse alternator, the introduction of the electromagnetic weapon load, the control technology of the pulse alternator power system, and the elaboration of other key components of the power system. This motor has been researched at home and abroad, but this book is the first international monograph on the field of pulse alternators in this field, which has very important academic value and reference value. The book benefits researchers, engineers, and graduate students in fields of electrical engineering, pulsed power, etc.

New Sensorless, Efficient Optimized and

Stabilized V/f Control for PMSM Machines
Springer
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.

Dissertation Abstracts International

CRC Press

A timely introduction to current research on PID and predictive control by one of the leading authors on the subject PID and Predictive Control of Electric Drives and Power Supplies using MATLAB/Simulink examines the classical control system strategies, such as PID control, feed-forward control and cascade control, which are widely used in current practice. The authors share their experiences in actual design and implementation of the control systems on laboratory test-beds, taking the reader from the fundamentals through to more sophisticated design and analysis. The book contains sections on closed-loop performance analysis in both frequency domain and time domain, presented to help the designer in selection of controller parameters and validation of the control system. Continuous-time model predictive

control systems are designed for the drives and power supplies, and operational constraints are imposed in the design. Discrete-time model predictive control systems are designed based on the discretization of the physical models, which will appeal to readers who are more familiar with sampled-data control system. Soft sensors and observers will be discussed for low cost implementation. Resonant control of the electric drives and power supply will be discussed to deal with the problems of bias in sensors and unbalanced three phase AC currents. Brings together both classical control systems and predictive control systems in a logical style from introductory through to advanced levels Demonstrates how simulation and experimental results are used to support theoretical analysis and the proposed design algorithms MATLAB and Simulink tutorials are given in each chapter to show the readers how to take the theory to applications. Includes MATLAB and Simulink software using xPC Target for teaching purposes A companion website is available Researchers and industrial engineers; and graduate students on electrical engineering courses will find this a valuable resource.

Smart Sensors Measurements and Instrumentation IGI Global

Environmental science is an interdisciplinary academic field that integrates physical-, biological-, and information sciences to study and solve environmental problems. ESSE - The International Conference on

Environmental Science and Sustainable Energy provides a platform for experts, professionals, and researchers to share updated information and stimulate the communication with each other. In 2017 it was held in Suzhou, China June 23-25, 2017.

Performance Comparison and Simulation of Permanent Magnet AC Drives and Parameter Estimation Techniques Springer Science & Business Media

The book presents the latest power conversion and control technology in modern wind energy systems. It has nine chapters, covering technology overview and market survey, electric generators and modeling, power converters and modulation techniques, wind turbine characteristics and configurations, and control schemes for fixed- and variable-speed wind energy systems. The book also provides in-depth steady-state and dynamic analysis of squirrel cage induction generator, doubly fed induction generator, and synchronous generator based wind energy systems. To illustrate the key concepts and help the reader tackle real-world issues, the book contains more than 30 case studies and 100 solved problems in addition to simulations and experiments. The book serves as a comprehensive reference for academic researchers and practicing engineers. It can also be used as a textbook for graduate students and final year undergraduate students.

High Performance Control of AC Drives with Matlab/Simulink Springer Nature

Document from the year 2022 in the subject Engineering - General, grade: 12,

, language: English, abstract: The creation of a simulation model for closed loop vector controlled IPMSM drive performance enhancement and speed control is described in this book. By regulating the torque component of the current, the model achieves superior speed tracking and rapid dynamic response under transient and steady-state circumstances. The control technique is used by both the proportional and integrated controllers in the PI controller. Combining two independent controllers and reducing the shortcomings of each results in a more effective controller. To offer optimal speed operation in the face of environmental changes, load variations, and structural disturbances, the Fuzzy Logic Controller for PMSM must be properly constructed. Using MATLAB Simulink, this book gives a comprehensive simulation of an internal permanent magnet synchronous motor driving system. Interior permanent magnet synchronous motors (IPMSMs) are used to improve machine performance and offer rapid torque response. IPMSMs are utilised in low and medium-power applications such as servos, robotics, variable-speed motors, electric vehicles, and computer peripherals. Because PM motor drives are becoming more popular, simulation systems capable of handling motor drive simulations are in great demand. Simulation tools can dynamically simulate motor drives in a visual environment, saving money and time and easing the development of new

systems.

Intelligent Systems: Models and Applications Springer Science & Business Media

With the advancements in magnetic materials and semiconductor technology, permanent magnet synchronous motor (PMSM) is becoming more and more popular in high power industrial applications due to its high energy density, high power factor, low noise and high efficiency as compared to conventional AC motors. Field oriented vector control (VC) and direct torque and flux control (DTFC) are used for high performance drives. Among these two techniques DTFC is faster and simpler than that of conventional VC scheme as DTFC scheme doesn't need any coordinate transformation, pulse width modulation and current regulators. The DTFC based motor drives utilizes hysteresis band comparators for both torque and flux controls. Both torque and flux are controlled simultaneously by the selection of appropriate voltage vectors from the inverter. However, DTFC suffers from high torque ripples due to discrete nature of control system and limited voltage vectors from the inverter. Torque ripples can be minimized by increasing the sector numbers of the DTFC scheme which increases the switching frequency of the inverter. Traditionally, researchers chose a constant value of reference air-gap flux to make the control task easy but it is not acceptable for high performance drives as the air-gap flux changes with the operating conditions and system

disturbances. Furthermore, if the reference air-gap flux is maintained constant, it is not possible to control the motor over the wide speed range operation. Moreover, conventional six-sector based DTFC scheme suffers from high torque ripples, which is the major drawbacks to achieve high dynamic performance. Therefore, this thesis presents a novel eighteen-sector based DTFC scheme to achieve high dynamic performance with minimum torque ripples. In addition, the loss minimization algorithm (LMA) is incorporated with proposed DTFC scheme in order to improve the efficiency while maintaining high dynamic performance. This thesis further presents modified eighteen-sector based DTFC scheme to overcome the unbalanced voltage effects in any sector of conventional six-sector based system to improve the dynamic performance of the proposed system. This thesis also presents a novel sector determination algorithm to determine the sector number of the stator flux linkage vector which reduces the computational burden to the microprocessor. A five level torque hysteresis comparator based DTFC scheme is also proposed to reduce the torque ripple. Further, a backstepping based nonlinear controller is developed for IPMSM drive that achieves the lowest possible torque ripples in steady state. In this controller development, the control variable is motor electromagnetic developed torque and stator air-gap flux linkages similar to classical DTFC but the errors are forced to zero using

backstepping process to get better dynamic performance. The effectiveness of the proposed systems is verified through the development of a simulation model using Matlab/Simulink. Performance of the proposed nonlinear controller is investigated extensively at different operating conditions such as sudden speed and load changes. Then the complete IPMSM drives, incorporating the proposed LMA and eighteen-sector based DTFC scheme and nonlinear controller with torque and flux as virtual control variables are successfully implemented in real-time using digital signal processor (DSP) board-DS1104 board for laboratory 5-hp motor. The effectiveness of the proposed control techniques are verified in both simulation and experiment at different operating conditions. It is found that, the nonlinear controller based IPMSM drive provides the best performance in terms of torque ripple among all the DTFC scheme developed in the thesis. The results show the robustness of the drive and it's potentiality to apply for real-time industrial drive applications.

Mechatronics and Automatic Control Systems Academic Press

The theory and applications of intelligent systems is today an important field of research. This book is an up-to-date collection of seventeen chapters, written by recognized experts in the field. In an introductory mathematical foundations part an overview of generalizations of the integral inequalities for nonadditive integrals and a construction of the General Prioritized Fuzzy Satisfaction

Problem is given. Then different aspects of robotics are presented, such as the differences between human beings and robots, the motion of bipedal humanoid robots, and an evaluation of different autonomous quadrotor flight controllers. Also Fuzzy Systems are presented by a model of basic planar imprecise geometric objects allowing various applications in image analysis , GIS, and robotics, as well as a type-2 fuzzy logic in a software library for developing perceptual computers, and a two--degree--of--freedom speed control solutions for a brushless Direct Current motor. The book also presents recent applications in medicine such as a Virtual Doctor System, methods for a face to face human machine interaction, and an emotion estimation, with applications for multiple diseases and the effect of the applied therapy. The last part of the book covers different applications in transportation, network monitoring, and localization of pedestrians in images.

Power Conversion and Control of Wind Energy Systems Springer Science & Business Media

Motion control is widely used in all types of industries including packaging, assembly, textile, paper, printing, food processing, wood products, machinery, electronics and semiconductor manufacturing. Industrial motion control applications use specialized equipment and require system design and integration. To design such systems, engineers need to be familiar with industrial motion control products; be

able to bring together control theory, kinematics, dynamics, electronics, simulation, programming and machine design; apply interdisciplinary knowledge; and deal with practical application issues. The book is intended to be an introduction to the topic for senior level undergraduate mechanical and electrical engineering students. It should also be resource for system design engineers, mechanical engineers, electrical engineers, project managers, industrial engineers, manufacturing engineers, product managers, field engineers, and programmers in industry.

Speed Control of Interior Permanent Magnet Synchronous Machine

Springer Nature

Tunan Shen aims to increase the availability of powertrain systems for autonomous electric vehicles by improving the diagnostic capability for critical faults. Following the fault analysis of powertrain systems in battery electric vehicles, the focus is on the electrical and mechanical faults of the electric machine. A multi-level diagnostic approach is proposed, which consists of multiple diagnostic models, such as a physical model, a data-based anomaly detection model, and a neural network model. To improve the overall diagnostic capability, a decision making function is designed to derive a comprehensive decision from the predictions of various operating points and different models.

Artificial Intelligence and Applied Mathematics in Engineering Problems

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.

Control Strategies of Permanent Magnet Synchronous Motor Drive for Electric Vehicles GRIN Verlag

This book examines mechatronics and automatic control systems. The book covers important emerging topics in signal processing, control theory, sensors, mechanic manufacturing systems and automation. The book presents papers from the 2013 International Conference on Mechatronics and Automatic Control

Systems in Hangzhou, held in China during August 10-11, 2013.

Field Oriented Control of Permanent Magnet Synchronous Motor with Third-harmonic Injection Pulse Width Modulation to Reduce Quadrotors' Speed Ripples CRC Press This book provides a unique approach to derive model-based torque controllers for all types of Lorentz force machines, i.e. DC, synchronous and induction machines. The rotating transformer model forms the basis for the generalized modeling approach of rotating field machines, which leads to the development of universal field-oriented control algorithms. Contrary to this, direct torque control algorithms, using observer-based methods, are developed for switched reluctance machines. Tutorials are included at the end of each chapter, and the reader is encouraged to execute these tutorials in order to gain familiarity with the dynamic behavior of drive systems. This updated edition uses PLECS® simulation and vector processing tools that were specifically adopted for the purpose of these hands-on tutorials. Hence, Advanced Electrical Drives encourages "learning by doing" and the experienced drive specialist may find the simulation tools useful to design high-performance torque controllers. Although it is a powerful reference in its own right, when used in conjunction with the companion texts Fundamentals of Electrical Drives and Applied Control of Electrical Drives, this book provides a uniquely comprehensive reference set that takes

readers all the way from understanding the basics of how electrical drives work, to deep familiarity with advanced features and models, to a mastery of applying the concepts to actual hardware in practice. Teaches readers to perform insightful analysis of AC electrical machines and drives; Introduces new modeling methods and modern control techniques for switched reluctance drives; Updated to use PLECS® simulation tools for modeling electrical drives, including new and more experimental results; Numerous tutorials at end of each chapter to learn by doing, step-by-step; Includes extra material featuring “build and play” lab modules, for lectures and self-study.

Permanent Magnet Motor Technology

Trans Tech Publications Ltd

The goal of the present thesis is to present a novel alternative for modeling and simulating the controls of the PMSM of a battery electric car using VHDL AMS. With this aim a valid model integrating the mechanics and electronic concepts behind the PMSM and the method to control it were implemented using the mentioned hardware description language. The motor model with its equations related to the d-q reference was choosed in order to apply the effective motor control strategy called Field Oriented Control. Finally the validation with the simulator of the model and its controls was successfully carried out obtaining the desired response and concluding with useful observations not only about the system itself like the importance of the inverter

switching frequency for a smooth response but also about the best method to apply for solving the problem optimizing time.

A Novel DTFC Based Efficiency and Dynamic Performance Improvement of IPMSM Drive John Wiley & Sons

This thesis investigates an artificial neural network (ANN)-based field-oriented control (FOC) for a surface-mounted and an interior-mounted permanent magnet synchronous machine (SPMSM and IPMSM). The ANN was trained by using Levenberg-Marquardt and forward accumulation through time algorithm. First, the thesis examines the fundamentals of motor parameters and two aforementioned vector controls, with training algorithms, in detail. Then, the background and various algorithms of Maximum Torque per Ampere (MTPA) and flux weakening (FW) control are undertaken while the following part epitomizes an off-the-shelf component-based electric vehicle (EV) model that is constructed using MATLAB SimPowerSystems and SimDriveline. The proposed control is validated in both simulation and hardware experiment and compared with a PI-based field-oriented control. First, for SPMSM, the results of simulation and hardware experiment show that the maximum operating speed of the proposed control is improved by 48% and 3.5% compared to the PI-based control. For IPMSM, the results show that the proposed control produces less d-axis current than the latter control. Moreover, the control is implemented and simulated in electric vehicle model,

which is constructed using SimPowerSystems and SimDriveline library in Simulink by the author with off-the-shelf components. The results show that the proposed controller can be a potential replacement of the existing control schemes, such as PID, fuzzy logic, or others, and provides adequate traction control in EV application.
Permanent Magnet Synchronous and Brushless DC Motor Drives Springer Nature
This thesis presents research on common PWM switching strategies implemented with permanent magnet AC machine drives. This study also considers online parameter estimation techniques that can be implemented with such drives. Finally a new simulation model of the drive and tools for modelling the specific machine under test are presented. Initially the research focuses on comparisons of the performance parameters which are influenced by the differences in current control strategies. Bang-Bang, PI and SVPWM controllers are the three alternative switching strategies which are discussed and then evaluated. The results highlight the impact the strategy selection has on the phase current quality and hence the power output of the motor under test. PI and SVPWM are both strategies that utilise a fixed switching frequency and as a result exhibit larger power losses in the inverter stage of the drive system. Bang-Bang control is seen to exhibit greater power losses in terms of output power in the motor stage as a direct result of the

poor quality phase current waveform generated. The experiments conducted allow for a thorough comparison of each strategy outlined. Techniques used to estimate the average phase voltage commanded under operation are presented in this thesis. Techniques for estimating phase voltage when operating the SVPWM technique on a wye connected machine is described, as are techniques for use with both PI and SVPWM control of a delta connected machine. This is based on published techniques that have been implemented for the PI wye connected case. The voltage estimation techniques are then used to estimate the flux linkage waveforms of the machine under test. Validation for this technique is sought through comparison of measurements with predictions made using commercially available finite element analysis tools; the measurements and predictions are shown to correlate to a significant degree. In search of validating the techniques against measurements made with calibrated measurement equipment - known to be reliable - the validation path results in subsequent techniques to be developed which estimate the average torque output of the machine under test. Torque measurements made using commercially available torque transducer equipment are compared with online estimates allowing for a validation of the voltage estimations. Using a new simulation environment - Portunus from Adapted Solutions - a modern permanent magnetic

synchronous machine drive system has been modelled. Making use of a PMSM component developed by Dr Mircea Popescu of Motor Design Ltd, a model of the drive system is constructed by the addition of customised components of the controller technology and other drive system hardware. This includes a custom developed C++ model of the SPEED laboratory FCIV technology which is used to control the drive system used in this research. Use of standard Portunus logic components is also presented which effectively models the interface of the gate drive signals with the voltage inverter components of the drive system. Finally the thesis details the results of simulations modelling the comparison of the control strategies of chapter 2 and also the online estimation techniques of chapter 3. The simulation model's inclusion of a dedicated machine component allows for effective tailoring of the system model on a per machine basis; this allows for a comparison of the results presented in the initial testing with the simulated equivalents. Such a comparison is also made between the results of the testing of the online torque estimation techniques and the simulated response of the estimation techniques. Strong correlation is shown between the results of the testing carried out in the early stages of the research using the drive system outlined in chapters 2 and 3 with the simulation results obtained using the model outlined in chapters 4 and 5.

Annual Review of Heat Transfer Springer Nature

This book presents the select proceedings of Control Instrumentation and System Conference, (CISCON 2020) held at Manipal Institute of Technology, MAHE, Manipal. It examines a wide spectrum covering the latest trends in the fields of instrumentation, sensors and systems, and industrial automation and control. The topics covered include image and signal processing, robotics, renewable energy, power systems and power drives, performance attributes of MEMS, multi-sensor data fusion, machine learning, optimization techniques, process control, safety monitoring, safety critical control, supervisory control, system modeling and virtual instrumentation. The book is a valuable reference for researchers and professionals interested in sensors, adaptive control, automation and control and allied fields.

Industrial Motion Control John Wiley & Sons

This volume includes extended and revised versions of a set of selected papers from the International Conference on Electric and Electronics (EEIC 2011) , held on June 20-22 , 2011, which is jointly organized by Nanchang University, Springer, and IEEE IAS Nanchang Chapter. The objective of EEIC 2011 Volume 3 is to provide a major interdisciplinary forum for the presentation of new approaches from Electrical Power Systems and Computers, to foster integration of the latest developments in scientific research. 133 related topic papers were selected into this volume. All the papers

were reviewed by 2 program committee members and selected by the volume editor Prof. Xiaofeng Wan. We hope every participant can have a good opportunity to exchange their research ideas and results and to discuss the state of the art in the areas of the Electrical Power Systems and Computers.

Advances in Electrical and Computer Technologies CRC Press

This volume presents the second part of the proceedings of the Mediterranean Conference on Information & Communication Technologies (MedICT 2015), which was held at Saidia, Morocco during 7–9 May, 2015. MedICT provides an excellent international forum to the researchers and practitioners from both academia as well as industry to meet and share cutting-edge development. The conference has also a special focus on enabling technologies for societal challenges, and seeks to address multidisciplinary challenges in Information & Communication Technologies such as health, demographic change, wellbeing, security and sustainability issues. The proceedings publish high quality papers which are closely related to the various theories, as well as emerging and practical applications of particular interest to the ICT community. This second volume provides a compact yet broad view of recent developments in Data, Systems, Services and Education, and covers recent research areas in the field including Control Systems, Software Engineering, Data Mining and Big Data,

ICT for Education and Support Activities, Networking, Cloud Computing and Security, ICT Based Services and Applications, Mobile Agent Systems, Software Engineering, Data Mining and Big Data, Online Experimentation & Artificial Intelligence in Education, Networking, Cloud Computing and Security, ICT Based Education and Services ICT Challenges and Applications, Advances in ICT Modeling and Design ICT Developments.