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VP21-09 Improved Flux Observer Sensorless Control of Permanent Magnet Assisted Synchronous Reluctance Motor

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An Improved Flux Observer For Sensorless Permanent Magnet

Slawomir Wiak,Maria Dems,Krzysztof Komeza

An Improved Flux Observer For Sensorless Permanent Magnet:

The Proceedings of 2024 International Conference of Electrical, Electronic and Networked Energy Systems Limin Jia,Fei Yang,Xian Cheng,Yi Wang,Zhengmao Li,Wanjun Huang,2025-02-13 This conference is one of the most significant annual events of the China Electrotechnical Society showcasing the latest research trends methodologies and experimental results in electrical electronic and networked energy systems The proceedings cover a wide range of cutting edge theories and ideas including topics such as power systems power electronics smart grids renewable energy energy integration in transportation advanced power technologies and the energy internet The aim of these proceedings is to provide a key interdisciplinary platform for researchers engineers academics and industry professionals to present groundbreaking developments in the field of electrical electronic and networked energy systems It also offers engineers and researchers from academia industry and government a comprehensive view of innovative solutions that integrate concepts from multiple disciplines These volumes serve as a valuable reference for researchers and graduate students in electrical engineering **Elektrische Antriebe - Regelung von Antriebssystemen** Dierk Schröder,2015-11-30 Elektrische Antriebe Regelung von Antriebssystemen ist Teil eines f nfb ndigen Lehr und Nachschlagewerkes Die bew hrte Struktur mit der Dreiteilung regelungstechnische Grundlagen Regelung der elektrischen Maschinen und Regelung der elektrischen Antriebe in unterschiedlichsten Anwendungen bleibt erhalten In der 4 Auflage wurden Anpassungen an den Stand der Technik sowie folgende Erweiterungen vorgenommen Vergleich und Literatur bersicht von Statorstrom Regelungen unter Beachtung der berkreuzkopplungen der Kompensation der Gegenspannungen und der Polverschiebungen Resonanter P Regler Kaskadierte Zustandsregelung Polfesselung Die Regelung von Drehfeldmaschinen ohne Drehzahlsensor wurde um die Realisierungen mittels Injektion von h herfrequenten Identifikationssignalen und um eine bersicht ber konstruktive Ma nahmen zur Verbesserung bzw dem Erzielen der Anisotrophie erweitert Die Regelung von technologischen Systemen wurde um die Regelung von Rollendruckmaschinen erg nzt Es folgen zwei neue Kapitel zu Aufbau Modellbildung und Regelung sowie zu den zuk nftigen Anforderungen an Windkraftwerke Im Kapitel Proper Orthogonal Decomposition POD wird die Reduzierung der Ordnung und die Optimalsteuerung von linearen aber auch nichtlinearen Systemen sehr hoher Ordnung vorgestellt Weitere Erg nzungen erfolgen mit den Kapiteln instabile Diskretisierungs Nullstellen Lund Grenoble Reibungsmodell und Vermeidung von Sensor bersteuerung **Advanced Control and Intelligent Computing Applications** Chen Peng,Yulong Wang,Yanpeng Guan,Qing Sun,Zhi Chen,Yajian Zhang,2024-12-28 The five volume set constitutes the thoroughly refereed proceedings of the 8th International Conference on Life System Modeling and Simulation LSMS 2024 and of the 8th International Conference on Intelligent Computing for Sustainable Energy and Environment ICSEE 2024 which were held during September 13 15 in Suzhou China The 29 papers presented were carefully reviewed and selected from over 496 submissions The LSMS and ICSEE international conference series aim to bring together international researchers and

practitioners in the fields of advanced methods for life system modeling and simulation as well as advanced intelligent computing theory methodologies and engineering applications in achieving net zero across all sectors to tackle the global climate change challenge **Sensorless Control of Permanent Magnet Synchronous Machine Drives** Zi Qiang Zhu,Xi Meng Wu,2023-11-14 A comprehensive resource providing basic principles and state of the art developments in sensorless control technologies for permanent magnet synchronous machine drives Sensorless Control of Permanent Magnet Synchronous Machine Drives highlights the global research achievements over the last three decades and the sensorless techniques developed by the authors and their colleagues and covers sensorless control techniques of permanent magnet machines discussing issues and solutions Many worked application examples are included to aid in practical understanding of concepts Written by two pioneering authors in the field Sensorless Control of Permanent Magnet Synchronous Machine Drives covers sample topics such as Permanent magnet brushless AC and DC drives Single three phase dual three phase and open winding machines Modern control theory based sensorless methods covering model reference adaptive system sliding mode observer extended Kalman filter and model predictive control Flux linkage and back EMF based methods for non salient machines and active flux linkage and extended back EMF methods for salient machines Pulsating and rotating high frequency sinusoidal and square wave signal injection methods with current or voltage response at different reference frames and selection of amplitude and frequency for injection signal Sensorless control techniques based on detecting third harmonic or zero crossings of back EMF waveforms Parasitic effects in fundamental and high frequency models impacts on position estimation and compensation schemes covering cross coupling magnetic saturation load effect machine saliency and multiple saliencies inverter non linearities voltage and current harmonics parameter asymmetries and parameter mismatches Techniques for rotor initial position estimation magnetic polarity detection and transition between low and high speeds Describing basic principles examples challenges and practical solutions Sensorless Control of Permanent Magnet Synchronous Machine Drives is a highly comprehensive resource on the subject for professionals working on electrical machines and drives particularly permanent magnet machines and researchers working on electric vehicles wind power generators household appliances and industrial automation The proceedings of the 10th Frontier Academic Forum of Electrical Engineering (FAFEE2022) Xuzhu Dong,Qingxin Yang,Weiming Ma,2023-08-23 This book includes the original peer reviewed research papers from the 10th Frontier Academic Forum of Electrical Engineering FAFEE 2022 held in Xi an China in August 2022 It gathers the latest research innovations and applications in the fields of Electrical Engineering The topics it covers include electrical materials and equipment electrical energy storage and device power electronics and drives new energy electric power system equipment IntelliSense and intelligent equipment biological electromagnetism and its applications and insulation and discharge computation for power equipment Given its scope the book benefits all researchers engineers and graduate students who want to learn about cutting edge advances in Electrical Engineering **Advanced**

Control Systems for Electric Drives Adel Merabet,2020-12-07 This book provides extensive information about advanced control techniques in electric drives Multiple control and estimation methods are studied for position and speed tracking in different drives Artificial intelligence tools such as fuzzy logic and neural networks are used for specific applications using electric drives **Advanced Direct Thrust Force Control of Linear Permanent Magnet Synchronous Motor** Muhammad Ali Masood Cheema,John Edward Fletcher,2020-02-13 This book explores the direct thrust force control DTFC of tubular surface mount linear permanent magnet synchronous motors linear PMSMs It presents a detailed account and analysis of several advanced nonlinear control schemes based on the direct thrust control principle to achieve a reduction in steady state ripple in thrust force with faster transient response and describes their experimental validation It also provides rigorous details of the dynamic modelling of linear PMSMs from a control system perspective and demonstrates the superior control performance of the proposed techniques compared to the current state of the art techniques Lastly the book proposes and validates a stator flux observer for sensorless speed estimation comprising a linear state observer and an improved sliding mode component **Conference Proceedings of 2022 2nd International Joint Conference on Energy, Electrical and Power Engineering** Cungang Hu,Wenping Cao,2023-08-02 This book will be a collection of the conference manuscripts presented at the 2022 2nd International Joint Conference on Energy Electrical and Power Engineering covering new and renewable energy electrical and power engineering It is expected to report the latest technological developments in the fields developed by academic researchers and industrial practitioners The application and dissemination of these technologies will benefit the research community as new research directions are becoming increasingly interdisciplinary requiring researchers from different research areas to come together and share ideas It will also benefit the electrical engineering and energy industry as we are now experiencing a new wave of industrial revolution i e the electrification intelligentisation and digitalisation of our transport manufacturing processes and way of thinking **The Proceedings of the 19th Annual Conference of China Electrotechnical Society** Qingxin Yang,Zhaohong Bie,Xu Yang,2025-01-06 This book compiles exceptional papers presented at the 19th Annual Conference of the China Electrotechnical Society CES held in Xi an China from September 20 to 22 2024 It encompasses a wide range of topics including electrical technology power systems electromagnetic emission technology and electrical equipment The book highlights innovative solutions that integrate concepts from various disciplines making it a valuable resource for researchers engineers practitioners research students and interested readers AC Electric Motors Control Fouad Giri,2013-03-25 The complexity of AC motor control lies in the multivariable and nonlinear nature of AC machine dynamics Recent advancements in control theory now make it possible to deal with long standing problems in AC motors control This text expertly draws on these developments to apply a wide range of model based control designmethods to a variety of AC motors Contributions from over thirty top researchers explain how modern control design methods can be used to achieve tight speed regulation optimal energetic efficiency and

operation reliability and safety by considering online state variable estimation in the absence of mechanical sensors power factor correction machine flux optimization fault detection and isolation and fault tolerant control Describing the complete control approach both controller and observer designs are demonstrated using advanced nonlinear methods stability and performance are analysed using powerful techniques including implementation considerations using digital computing means Other key features Covers the main types of AC motors including triphase multiphase and doubly fed induction motors wound rotor permanent magnet and interior PM synchronous motors Illustrates the usefulness of the advanced control methods via industrial applications including electric vehicles high speed trains steel mills and more Includes special focus on sensorless nonlinear observers adaptive and robust nonlinear controllers output feedback controllers fault detection and isolation algorithms and fault tolerant controllers This comprehensive volume provides researchers and designers and R D engineers with a single source reference on AC motor system drives in the automotive and transportation industry It will also appeal to advanced students in automatic control electrical power systems mechanical engineering and robotics as well as mechatronic process and applied control system engineers The Proceedings of the 17th Annual Conference of China Electrotechnical Society Kaigui Xie,Jianlin Hu,Qingxin Yang,Jian Li,2023-03-30 This book gathers outstanding papers presented at the 17th Annual Conference of China Electrotechnical Society organized by China Electrotechnical Society CES held in Beijing China from September 17 to 18 2022 It covers topics such as electrical technology power systems electromagnetic emission technology and electrical equipment It introduces the innovative solutions that combine ideas from multiple disciplines The book is very much helpful and useful for the researchers engineers practitioners research students and interested readers

Integration of Electric Vehicles and Battery Storage Systems Hrvoje Pandžić,2021-04-22 Achieving the goal of green and environmentally friendly energy systems is not possible without the concept of energy storage Such storage should charge when renewable generation e g photovoltaics and wind farms is abundant and discharge during periods of its scarcity Although pumped hydropower plants have been widely used as extremely large capacity energy storage the recent technological developments in lithium based batteries have made them economically feasible The major advantages of batteries over a conventional energy storage system i e hydropower include its modularity and ease of integration with the transport system This Special Issue is thus focused on both stationary batteries and mobile batteries in electric vehicles Both should be used to provide flexibility and balancing services to power systems While stationary batteries are focused solely on the power system the batteries within electric vehicles need to primarily fulfill the task of providing energy for transportation This is why their use in power systems is secondary However due to generally long parking periods they can become a detrimental asset in terms of balancing the power system The Proceedings of 2023 International Conference on Wireless Power Transfer (ICWPT2023) Chunwei Cai,Xiaohui Qu,Ruikun Mai,Pengcheng Zhang,Wenping Chai,Shuai Wu,2024-03-07 This book includes original peer reviewed research papers from the 2023 International Conference on Wireless Power

Transfer ICWPT2023 held in Weihai China The topics covered include but are not limited to wireless power transfer technology and systems coupling mechanism and electromagnetic field of wireless power transfer systems latest developments in wireless power transfer system and wide applications The papers share the latest findings in the field of wireless power transfer making the book a valuable asset for researchers engineers university students etc *The Proceedings of 2024 International Conference of Electrical, Electronic and Networked Energy Systems* Aimin Sha,Li Zhang,Jishen Peng,XIaoheng Yan,Cancan Rong,Zheming Jin,2025-02-17 This conference is one of the most significant annual events of the China Electrotechnical Society showcasing the latest research trends methodologies and experimental results in electrical electronic and networked energy systems The proceedings cover a wide range of cutting edge theories and ideas including topics such as power systems power electronics smart grids renewable energy energy integration in transportation advanced power technologies and the energy internet The aim of these proceedings is to provide a key interdisciplinary platform for researchers engineers academics and industry professionals to present groundbreaking developments in the field of electrical electronic and networked energy systems It also offers engineers and researchers from academia industry and government a comprehensive view of innovative solutions that integrate concepts from multiple disciplines These volumes serve as a valuable reference for researchers and graduate students in electrical engineering Control of Electric Machine Drive Systems Seung-Ki Sul,2011-04-20 A unique approach to sensorless control and regulator design of electric drives Based on the author s vast industry experience and collaborative works with other industries Control of Electric Machine Drive Systems is packed with tested implemented and verified ideas that engineers can apply to everyday problems in the field Originally published in Korean as a textbook this highly practical updated version features the latest information on the control of electric machines and apparatus as well as a new chapter on sensorless control of AC machines a topic not covered in any other publication The book begins by explaining the features of the electric drive system and trends of development in related technologies as well as the basic structure and operation principles of the electric machine It also addresses steady state characteristics and control of the machines and the transformation of physical variables of AC machines using reference frame theory in order to provide a proper foundation for the material The heart of the book reviews several control algorithms of electric machines and power converters explaining active damping and how to regulate current speed and position in a feedback manner Seung Ki Sul introduces tricks to enhance the control performance of the electric machines and the algorithm to detect the phase angle of an AC source and to control DC link voltages of power converters Topics also covered are Vector control Control algorithms for position speed sensorless drive of AC machines Methods for identifying the parameters of electric machines and power converters The matrix algebra to model a three phase AC machine in d q n axes Every chapter features exercise problems drawn from actual industry experience The book also includes more than 300 figures and offers access to an FTP site which provides MATLAB programs for selected problems The book s

practicality and realworld relatability make it an invaluable resource for professionals and engineers involved in the research and development of electric machine drive business industrial drive designers and senior undergraduate and graduate students To obtain instructor materials please send an email to pressbooks ieee org To visit this book s FTP site to download MATLAB codes please click on this link ftp ftp wiley com public sci_tech_med electric_machine MATLAB codes are also downloadable from Wiley Booksupport Site at http booksupport wiley com The Proceedings of the 18th Annual Conference of China Electrotechnical Society Qingxin Yang,Zewen Li,An Luo,2024-04-01 This book gathers outstanding papers presented at the 18th Annual Conference of China Electrotechnical Society organized by China Electrotechnical Society CES held in Nanchang China from September 15 to 17 2023 It covers topics such as electrical technology power systems electromagnetic emission technology and electrical equipment It introduces the innovative solutions that combine ideas from multiple disciplines The book is very much helpful and useful for the researchers engineers practitioners research students and interested readers **Recent Developments of Electrical Drives** Slawomir Wiak,Maria Dems,Krzysztof Komeza,2007-06-08 Recent Developments of Electrical Drives is composed of the papers which cover a wide spectrum of theory and practice thus they are deeply rooted in engineering problems being simultaneously of high theoretical level This way the contents touches the heart of the matter in electrical drives theory control systems and applications The book stating the recent developments of electrical drives can be useful for engineers and researchers investigating and designing electrical and electronic devices as well as for students and young researchers dealing with electrical and electronic engineering computer sciences advanced computer modelling sophisticated control systems with artificial intelligence tools applied optimal design bye use of classical and genetic algorithms employed applied mathematics and all the topics where electromagnetic thermal mechanical phenomena occur Recent Developments of Electrical Drives covers a wide range of interests of industry engineers and scientists involved in modelling control measurements new motor structures design and could be also useful for engineers working in the field of electrical drives implementation Control and Mechatronics Bodgan Wilamowski,J. David Irwin,2018-10-08 The Industrial Electronics Handbook Second Edition combines traditional and newer more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high power applications Embracing the broad technological scope of the field this collection explores fundamental areas including analog and digital circuits electronics electromagnetic machines signal processing and industrial control and communications systems It also facilitates the use of intelligent systems such as neural networks fuzzy systems and evolutionary methods in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components Enhancing its value this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal one of the largest and most respected publications in the field Control and Mechatronics presents concepts of control theory in a way that makes

them easily understandable and practically useful for engineers or students working with control system applications Focusing more on practical applications than on mathematics this book avoids typical theorems and proofs and instead uses plain language and useful examples to Concentrate on control system analysis and design comparing various techniques Cover estimation observation and identification of the objects to be controlled to ensure accurate system models before production Explore the various aspects of robotics and mechatronics Other volumes in the set Fundamentals of Industrial Electronics Power Electronics and Motor Drives Industrial Communication Systems Intelligent Systems Control Applications in Modern Power Systems Arvind Kumar Prajapati,Manoj Tripathy,Asheesh K. Singh,Vijay K. Sood,Om P. Malik,2025-03-24 The book titled Control Applications in Modern Power System select proceedings of EPREC 2024 delves into in depth discussions case studies and recent advancements within the burgeoning field of control systems It specifically focuses on areas such as load frequency control wide area monitoring control and instrumentation optimization intelligent control energy management systems and SCADA systems The development of effective control strategies plays a pivotal role in managing reactive power and upholding voltage profiles among other critical aspects Readers stand to gain valuable insights bolstering their knowledge and expertise in these domains Furthermore this book has the potential to inspire fresh and innovative ideas Whether a newcomer a researcher or a seasoned professional this book serves as an invaluable reference for all for staying abreast of the latest developments in control systems *Variable Speed Generators* Ion Boldea,2015-09-03 Variable Speed Generators the second of two volumes in the Electric Generators Handbook provides extensive coverage of variable speed generators in distributed generation and renewable energy applications around the world The book delves into the steady state transients control and design of claw pole rotor synchronous induction permanent magnet PM assisted synchronous and switched reluctance starter alternators for electric hybrid vehicles It discusses PM synchronous transverse flux PM and flux reversal PM generators for low speed wind and hydro energy conversion It also explores linear motion alternators for residential and spacecraft applications Numerous design and control examples illustrate the exposition Fully revised and updated to reflect the last decade s worth of progress in the field this Second Edition adds new sections that Address the ride through control of doubly fed induction generators under unbalanced voltage sags Consider the control of stand alone doubly fed induction generators under unbalanced nonlinear loads Detail a stand alone squirrel cage induction generator SCIG with AC output and a low rating pulse width modulated PWM converter Present a twin stator winding SCIG with 50 percent rating inverter and diode rectifier and a dual stator winding induction generator with nested cage rotor Examine interior permanent magnet claw pole alternator systems for more vehicle braking energy recuperation and high power factor Vernier PM generators Depict a PM assisted reluctance synchronous motor generator for an electric hybrid vehicle and a double stator switched reluctance generator with segmented rotor Describe the grid to stand alone transition motion sensorless dual inverter control of permanent magnet synchronous generators with

asymmetrical grid voltage sags and harmonics filtering The promise of renewable sustainable energy rests on our ability to design innovative power systems that are able to harness energy from a variety of sources Variable Speed Generators Second Edition supplies state of the art tools necessary to design validate and deploy the right power generation technologies to fulfill tomorrow s complex energy needs

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