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ELECTRONIC ENGINEERING - 27

# Parameter Estimation, Condition Monitoring, and Diagnosis of Electrical Machines

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OXFORD SCIENCE PUBLICATIONS

# Parameter Estimation Condition Monitoring And Diagnosis Of Electrical Machines

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Nandi, Seungdeog Choi, Homayoun  
Meshgin-Kelk**



## **Parameter Estimation Condition Monitoring And Diagnosis Of Electrical Machines:**

**Parameter Estimation, Condition Monitoring, and Diagnosis of Electrical Machines** Peter Vas,1993 Condition monitoring of electrical machines and drive systems is a vital factor to achieve efficient and profitable operation of a large variety of industrial processes Similarly parameter estimation is important for the machine designer and invaluable to the operator of modern drives implementing various types of controllers It is also necessary to know the machine parameters for a number of simulation purposes The chapters in this volume cover recent trends and advances in these and other areas including sections on on line and off line parameter estimation of smooth air gap and salient pole electrical machines their diagnosis and condition monitoring New real time monitoring devices vibroacoustic techniques and the symptoms and possible causes of failures of electrical machines are also discussed In the book a unified and in depth physical and mathematical analysis of the various parameter estimators and condition monitoring methods is presented For this purpose where possible space phasor theory is utilized and the most recent and modern developments in the field are incorporated The book is intended for academic and professional electrical engineers and all those responsible for the performance maintenance and design of electrical machines and drive systems Parameter Estimation, Condition Monitoring, and Diagnosis of Electrical Machines Peter Vas,2023 Offers a discussion of on line and off line parameter estimation of smooth air gap and salient pole electrical machines and their diagnosis and condition monitoring This book presents a physical and mathematical analysis of the various parameter estimators and condition monitoring methods **Condition Monitoring of Rotating Electrical Machines** Peter Tavner,2008-07-12 A first edition of Condition Monitoring of Electrical Machines written by Tavner and Penman was published in 1987 The economics of industry have now changed as a result of the privatisation and deregulation of the energy industry placing emphasis on the importance of reliable operation of plant throughout the whole life cycle regardless of first cost The availability of advanced electronics and software in powerful instrumentation computers and digital signal processors DSP has simplified our ability to instrument and analyse machinery As a result condition monitoring is now being applied to a wider range of systems from fault tolerant drives of a few hundred watts in the aerospace industry to machinery of a few hundred megawatts in major capital plant In this new book the original authors have been joined by Ran an expert in power electronics and control and Sedding an expert in the monitoring of electrical insulation systems Together the authors have revised and expanded the earlier book merging their own experience with that of machine analysts to bring it up to date BOOK JACKET **Condition Monitoring of Rotating Electrical Machines** Peter Tavner,Li Ran,Christopher Crabtree,2020-06-04 Condition monitoring of engineering plants has increased in importance as engineering processes have become increasingly automated However electrical machinery usually receives attention only at infrequent intervals when the plant or the electricity generator is shut down The economics of industry have been changing placing ever more emphasis on the importance of reliable operation of the plants Electronics and software in

instrumentation computers and digital signal processors have improved our ability to analyse machinery online Condition monitoring is now being applied to a range of systems from fault tolerant drives of a few hundred watts to machinery of a few hundred MW in major plants

Condition Monitoring and Faults Diagnosis of Induction Motors Nordin Saad, Muhammad Irfan, Rosdiazli Ibrahim, 2018-07-11 The book covers various issues related to machinery condition monitoring signal processing and conditioning instrumentation and measurements faults for induction motors failures new trends in condition monitoring and the fault identification process using motor currents electrical signature analysis It aims to present a new non invasive and non intrusive condition monitoring system which has the capability to detect various defects in induction motor at incipient stages within an arbitrary noise conditions The performance of the developed system has been analyzed theoretically and experimentally under various loading conditions of the motor Covers current and new approaches applied to fault diagnosis and condition monitoring Integrates concepts and practical implementation of electrical signature analysis Utilizes LabVIEW tool for condition monitoring problems Incorporates real world case studies Paves way a technology potentially for prescriptive maintenance via IIoT

Soft Computing in Condition Monitoring and Diagnostics of Electrical and Mechanical Systems Hasmat Malik, Atif Iqbal, Amit Kumar Yadav, 2020-01-17 This book addresses a range of complex issues associated with condition monitoring CM fault diagnosis and detection FDD in smart buildings wide area monitoring WAM wind energy conversion systems WECSs photovoltaic PV systems structures electrical systems mechanical systems smart grids etc The book s goal is to develop and combine all advanced nonintrusive CMFD approaches on a common platform To do so it explores the main components of various systems used for CMFD purposes The content is divided into three main parts the first of which provides a brief introduction before focusing on the state of the art and major research gaps in the area of CMFD The second part covers the step by step implementation of novel soft computing applications in CMFD for electrical and mechanical systems In the third and final part the simulation codes for each chapter are included in an extensive appendix to support newcomers to the field

Electric Machines Hamid A. Toliyat, Subhasis Nandi, Seungdeog Choi, Homayoun Meshgin-Kelk, 2017-12-19 With countless electric motors being used in daily life in everything from transportation and medical treatment to military operation and communication unexpected failures can lead to the loss of valuable human life or a costly standstill in industry To prevent this it is important to precisely detect or continuously monitor the working condition of a motor Electric Machines Modeling Condition Monitoring and Fault Diagnosis reviews diagnosis technologies and provides an application guide for readers who want to research develop and implement a more effective fault diagnosis and condition monitoring scheme thus improving safety and reliability in electric motor operation It also supplies a solid foundation in the fundamentals of fault cause and effect Combines Theoretical Analysis and Practical Application Written by experts in electrical engineering the book approaches the fault diagnosis of electrical motors through the process of theoretical analysis and practical application It begins by explaining how to analyze the fundamentals of

machine failure using the winding functions method the magnetic equivalent circuit method and finite element analysis It then examines how to implement fault diagnosis using techniques such as the motor current signature analysis MCSA method frequency domain method model based techniques and a pattern recognition scheme Emphasizing the MCSA implementation method the authors discuss robust signal processing techniques and the implementation of reference frame theory based fault diagnosis for hybrid vehicles Fault Modeling Diagnosis and Implementation in One Volume Based on years of research and development at the Electrical Machines Power Electronics EMPE Laboratory at Texas A M University this book describes practical analysis and implementation strategies that readers can use in their work It brings together in one volume the fundamentals of motor fault conditions advanced fault modeling theory fault diagnosis techniques and low cost DSP based fault diagnosis implementation strategies

**Analysis of Electrical Machines** Valeria Hrabovcova,Pavol Rafajdus,Pavol Makyš,2020-05-20 This book is devoted to students PhD students postgraduates of electrical engineering researchers and scientists dealing with the analysis design and optimization of electrical machine properties The purpose is to present methods used for the analysis of transients and steady state conditions In three chapters the following methods are presented 1 a method in which the parameters resistances and inductances are calculated on the basis of geometrical dimensions and material properties made in the design process 2 a method of general theory of electrical machines in which the transients are investigated in two perpendicular axes and 3 FEM which is a mathematical method applied to electrical machines to investigate many of their properties

**Artificial-Intelligence-based Electrical Machines and Drives** Peter Vas,1999-01-28 Recently AI techniques have received increased attention world wide and at present 2 industrial drives incorporate some form of AI This is the first comprehensive book which discusses numerous AI applications to electrical machines and drives

Vector Control and Dynamics of AC Drives D. W. Novotny,T. A. Lipo,1996 Electric drive systems is an area of great change and increasing commercial importance in industry today Written by experts in the field this book takes account of recent developments These have been due largely to the advances in power electronics and computer control in turn they have made possible the implementation of a c drive systems in place of d c Topics include inverter machine dynamics constant speed behavior and the development of conventional equivalent circuits vector controlled systems and current regulators

30th International Conference on Organization and Technology of Maintenance (OTO 2021) Hrvoje Glavaš,Marijana Hadzima-Nyarko,Mirko Karakašić,Naida Ademović,Samir Avdaković,2021-12-07 This book promotes an interdisciplinary approach to maintenance through the presentation of practical and theoretical research in the field of electrical civil and mechanical engineering The goal is to raise the level of maintenance knowledge taking into account the continuous advancement of engineering and technology in all spheres of economy infrastructure and public services This book contains papers presented at the 30th International Conference on Organization and Technology of Maintenance OTO 2021 and the conference was held on Josip Juraj Strossmayer University of Osijek Faculty of Electrical

Engineering Computer Science and Information Technology Osijek on 10-11 December 2021. The book brings 36 original papers written by authors from ten countries that underwent a blind review process by the international review board members. The conference covers the topics as organization and management of maintenance, maintenance technologies, quality management in system maintenance, information systems in maintenance, product lifecycle management design for maintainability, material and structure properties, reliability of technical systems and environmental safety, diagnosis and prognosis of failures and operational malfunctions, design optimization for maintenance, maintenance in technical systems, analysis of efficiency and cost effectiveness of maintenance, influence of maintenance on the environment and employee safety, maintenance legislation and education for maintenance. The papers presented in the book reflect the current state of approach to maintenance as an interdisciplinary field. The OTO conference proved itself as an ideal opportunity for communication between scientists and experts in maintenance practice with the aim to raise the level of expertise and introduce new methods and maintenance procedures into everyday practice.

**Computational Science And Its Applications - Iccsa 2005** Osvaldo Gervasi, 2005-04-27. The four volume set LNCS 3480-3483 constitutes the refereed proceedings of the International Conference on Computational Science and Its Applications ICCSA 2005 held in Singapore in May 2005. The four volumes present a total of 540 papers selected from around 2700 submissions. The papers span the whole range of computational science comprising advanced applications in virtually all sciences making use of computational techniques as well as foundations, techniques and methodologies from computer science and mathematics such as high performance computing and communication networking, optimization, information systems and technologies, scientific visualization, graphics, image processing, data analysis, simulation and modelling, software systems, algorithms, security, multimedia etc.

Permanent Magnet Motor Technology Jacek F. Gieras, 2009-08-25. 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

### **Electrical Machines**

**Diagnosis** Jean-Claude Trigeassou,2013-02-07 Monitoring and diagnosis of electrical machine faults is a scientific and economic issue which is motivated by objectives for reliability and serviceability in electrical drives This book provides a survey of the techniques used to detect the faults occurring in electrical drives electrical thermal and mechanical faults of the electrical machine faults of the static converter and faults of the energy storage unit Diagnosis of faults occurring in electrical drives is an essential part of a global monitoring system used to improve reliability and serviceability This diagnosis is performed with a large variety of techniques parameter estimation state observation Kalman filtering spectral analysis neural networks fuzzy logic artificial intelligence etc Particular emphasis in this book is put on the modeling of the electrical machine in faulty situations Electrical Machines Diagnosis presents original results obtained mainly by French researchers in different domains It will be useful as a guideline for the conception of more robust electrical machines and indeed for engineers who have to monitor and maintain electrical drives As the monitoring and diagnosis of electrical machines is still an open domain this book will also be very useful to researchers

### **Modern Electric Vehicle Technology** C. C. Chan,K. T.

Chau,2001 A comprehensive and up to date reference book on modern electric vehicle technology which covers the engineering philosophy state of the art technology and commercialisation of electrical vehicles

### **Handbook of**

**Asynchronous Machines with Variable Speed** Hubert Razik,2013-01-24 This handbook deals with the asynchronous machine in its close environment It was born from a reflection on this electromagnetic converter whose integration in industrial environments takes a wide part Previously this type of motor operated at fixed speed from now on it has been integrated more and more in processes at variable speed For this reason it seemed useful or necessary to write a handbook on the various aspects from the motor in itself via the control and while finishing by the diagnosis aspect Indeed an asynchronous motor is used nowadays in industry where variation speed and reliability are necessary We must know permanently for the sensitive systems the state of process and to inform the operator of the appearance of any anomaly and its severity

**Parameter Estimation of Permanent Magnet Synchronous Machines** Zi Qiang Zhu,Kan Liu,Dawei Liang,2025-06-11 Comprehensive reference delivering basic principles and state of the art parameter estimation techniques for permanent magnet synchronous machines PMSMs Parameter Estimation of Permanent Magnet Synchronous Machines reviews estimation techniques of the parameters of PMSMs introducing basic models and techniques as well as issues and solutions in parameter estimation challenges including rank deficiency inverter nonlinearity and magnetic saturation This

book is supported by theories experiments and simulation examples for each technique covered Topics explored in this book include Electrical and mechanical parameter estimation techniques including those based on current voltage injection and position offset injection under constant or variable speed and load for sensed or sensorless controlled PMSMs accounting for magnetic saturation cross coupling inverter nonlinearity temperature effects and more Recursive least squares the Kalman filter model reference adaptive systems Adaline neural networks gradient based methods particle swarm optimization and genetic algorithms Applications of parameter estimation techniques for improvement of control performance sensorless control thermal condition monitoring and fault diagnosis This book is an essential reference for professionals working on the control and design of electrical machines researchers studying electric vehicles wind power generators aerospace industrial drives automation systems robots and domestic appliances as well as advanced undergraduate and graduate students in related programs of study

*Advances and Applications in Nonlinear Control Systems* Sundarapandian Vaidyanathan, Christos Volos, 2016-03-17 The book reports on the latest advances and applications of nonlinear control systems It consists of 30 contributed chapters by subject experts who are specialized in the various topics addressed in this book The special chapters have been brought out in the broad areas of nonlinear control systems such as robotics nonlinear circuits power systems memristors underwater vehicles chemical processes observer design output regulation backstepping control sliding mode control time delayed control variables structure control robust adaptive control fuzzy logic control chaos hyperchaos jerk systems hyperjerk systems chaos control chaos synchronization etc Special importance was given to chapters offering practical solutions modeling and novel control methods for the recent research problems in nonlinear control systems This book will serve as a reference book for graduate students and researchers with a basic knowledge of electrical and control systems engineering The resulting design procedures on the nonlinear control systems are emphasized using MATLAB software

*Induction Motor Control Design* Riccardo Marino, Patrizio Tomei, Cristiano M. Verrelli, 2010-08-20 This book provides the most important steps and concerns in the design of estimation and control algorithms for induction motors A single notation and modern nonlinear control terminology is used to make the book accessible although a more theoretical control viewpoint is also given Focusing on the induction motor with the concepts of stability and nonlinear control theory given in appendices this book covers speed sensorless control design of adaptive observers and parameter estimators a discussion of nonlinear adaptive controls containing parameter estimation algorithms and comparative simulations of different control algorithms The book sets out basic assumptions structural properties modelling state feedback control and estimation algorithms then moves to more complex output feedback control algorithms based on stator current measurements and modelling for speed sensorless control The induction motor exhibits many typical and unavoidable nonlinear features

*Advanced Condition Monitoring and Fault Diagnosis of Electric Machines* Irfan, Muhammad, 2018-09-14 The reliability of induction motors is a major requirement in many industrial



applications It is especially important where an unexpected breakdown might result in the interruption of critical services such as military operations transportation aviation and medical applications Advanced Condition Monitoring and Fault Diagnosis of Electric Machines is a collection of innovative research on various issues related to machinery condition monitoring signal processing and conditioning instrumentation and measurements and new trends in condition monitoring It also pays special attention to the fault identification process While highlighting topics including spectral analysis electrical engineering and bearing faults this book is an ideal reference source for electrical engineers mechanical engineers researchers and graduate level students seeking current research on various methods of maintaining machinery

Uncover the mysteries within Explore with is enigmatic creation, **Parameter Estimation Condition Monitoring And Diagnosis Of Electrical Machines** . This downloadable ebook, shrouded in suspense, is available in a PDF format ( PDF Size: \*). Dive into a world of uncertainty and anticipation. Download now to unravel the secrets hidden within the pages.

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