

Electrical Machines Diagnosis

Fault Diagnosis and Detection Recent Developments of Electrical Drives Wavelet Transform and Some of Its Real-World Applications Electrical Machines and Drives Performances of the PCA Method in Electrical Machines Diagnosis Using Matlab Permanent Magnet Synchronous Machines Parameter Estimation, Condition Monitoring, and Diagnosis of Electrical Machines Electrical Machines Diagnosis Electric Machines for Smart Grids Applications Mechanical Fault Diagnosis and condition monitoring Modeling and Control of AC Machine using MATLAB®/SIMULINK Advanced Condition Monitoring and Fault Diagnosis of Electric Machines Induction Motor Fault Diagnosis Electrical Systems 12019 IEEE Workshop on Electrical Machines Design, Control and Diagnosis (WEMDCD) Fault Detection and Diagnosis Fault Diagnosis and Failure Prognosis of Electrical Machines Electrical Systems 2 Condition Monitoring of Rotating Electrical Machines Detection and Diagnosis of Faults in Electrical Machines Diagnosis and Fault Tolerance of Electrical Machines and Power Electronics Machinery Condition Monitoring Proceedings, 2019 IEEE Workshop on Electrical Machines Design, Control and Diagnosis (WEMDCD) 2019 IEEE Workshop on Electrical Machines Design, Control and Diagnosis (WEMDCD) Signal Processing for Fault Detection and Diagnosis in Electric Machines and Systems Rotating Electrical Machines Non-Destructive Testing Design of Rotating Electrical Machines Parameter Estimation, Condition Monitoring, and Diagnosis of Electrical Machines Technological Innovation for the Internet of

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Fault Diagnosis and Detection

In this book a general matrix-based approach to modeling electrical machines is promulgated. The model uses instantaneous quantities for key variables and enables the user to easily take into account associations between rotating machines and static converters (such as in variable speed drives). General equations of electromechanical energy conversion are established early in the treatment of the topic and then applied to synchronous, induction and DC machines. The primary characteristics of these machines are established for steady state behavior as well as for variable speed scenarios. Important new applications for this technology (such as wind turbines, electric propulsion systems for large ships, etc.) are addressed and the book is illustrated with a large number of informative and detailed photographs, provided by various companies at the

leading edge of research and applications in the field.

Recent Developments of Electrical Drives

Wavelet Transform and Some of Its Real-World Applications

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.

Electrical Machines and Drives

In one complete volume, this essential reference presents an in-depth overview of the theoretical principles and techniques of electrical machine design. This timely new edition offers up-to-date theory and guidelines for the design of electrical machines, taking into account recent advances in permanent magnet machines as well as synchronous reluctance machines. New coverage includes: Brand new material on the ecological impact of the motors, covering the eco-design principles of rotating electrical machines An expanded section on the design of permanent magnet synchronous machines, now reporting on the design of tooth-coil, high-torque permanent magnet machines and their properties Large updates and new material on synchronous reluctance machines, air-gap inductance, losses in and resistivity of permanent magnets (PM), operating point of loaded PM circuit, PM machine design, and minimizing the losses in electrical machines> End-of-chapter exercises and new direct design examples with methods and solutions to real design problems> A supplementary website hosts two machine design examples created with MATHCAD: rotor surface magnet permanent magnet machine and squirrel cage induction machine calculations. Also a MATLAB code for optimizing

the design of an induction motor is provided Outlining a step-by-step sequence of machine design, this book enables electrical machine designers to design rotating electrical machines. With a thorough treatment of all existing and emerging technologies in the field, it is a useful manual for professionals working in the diagnosis of electrical machines and drives. A rigorous introduction to the theoretical principles and techniques makes the book invaluable to senior electrical engineering students, postgraduates, researchers and university lecturers involved in electrical drives technology and electromechanical energy conversion.

Performances of the PCA Method in Electrical Machines Diagnosis Using Matlab

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 Synchronous Machines

This book offers a selection of papers in the field of fault detection and diagnosis, promoting new research results in the field, which come to join other publications in the literature. Authors from countries of four continents: United States of America, South Africa, China, India, Algeria and Croatia published worked examples and case studies resulting from their research in the field. Fault detection and diagnosis has a great importance in all industrial processes, to assure the monitoring, maintenance and repair of the complex processes, including all hardware, firmware and software. The book has four sections, determined by the application domain and the methods used: 1. Hybrid Computing Systems, 2. Power Systems, 3. Power Electronics and 4. Kalman Filtering. In the first section, the readers will find a technical report on fault diagnosis of hybrid computing systems, based on the chaotic-map method that uses the exponential divergence and wide Fourier properties of the trajectories, combined with memory allocations and assignments. In the second section, two chapters are included: one of them presents a study on preventive maintenance and fault detection for wind turbine generators using statistical models and the second chapter presents a technical report on fault diagnosis for turbo-generators, based on the mechanical-electrical

intersectional characteristics. The third section contains a technical report that presents some techniques of detection and localization of open-circuit faults in a three-phase voltage source inverter fed induction motor. The fourth section presents a theoretical study on the application of distributed discrete-time linear Kalman filtering with decentralized structure of sensors in fault residual generation.

Parameter Estimation, Condition Monitoring, and Diagnosis of Electrical Machines

Up-to-date and system-oriented, this is a comprehensive, unified guide to possible faults in electromechatronic systems. It encompasses techniques for fault analysis, diagnostics, condition monitoring methods, reconfiguration, remedial operating strategies and fault tolerance in electrical machines, power electronics and key types of drives. It also covers remnant life estimation. A vital resource for researchers and professionals specialising in the design, development and application of electrical machines and power electronics.

Electrical Machines Diagnosis

Discusses the hypotheses for the research works are: 1. It is possible to capture the irregular conditions due to faults of the electrical machines by utilising a

generalised mathematical model of the electrical machine. 2. It is also possible to derive a complete mathematical model of the machine that takes the operating conditions obtained from the experiments conducted on such a machine into consideration. It is believed that when such complete equations are solved, it will be able to produce expected signals. 3. It may be possible that the data from experiment can be used to test the techniques developed and methods considered for fault diagnosis. The expense of electrical machine repairs and refurbishing might not be substantial. However, the cost associated with down time is enormous. Thus, a system that provides early detection of machine deterioration, would prevent costly damage or failure and unsafe operation. Such a system is important to minimise the downtime and optimise the maintenance schedule of the machine. The faults in other types of electrical machines were not involved in this research work. The research work was limited to winding faults associated with induction machines.

Electric Machines for Smart Grids Applications

The book contains six chapters. The use of the progressive regressive strategy for biometrical authentication through the use of human gait and face images was investigated. A new lossy image compression technique that uses singular value decomposition and wavelet difference reduction technique was proposed. The best wavelet packet based selection algorithm and its application in image denoising

was discussed. The scaling factor threshold estimator in different color models using a discrete wavelet transform for steganographic algorithms was presented. The extraction of features appearing in current signal using wavelet analysis when there is rotor fault of eccentricity and broken rotor bar was debated. The application of the empirical wavelet transform for seismic anomalies detection in ultralow-frequency geomagnetic signals was illustrated.

Mechanical Fault Diagnosis and condition monitoring

Condition monitoring, fault diagnosis and prognosis of machinery have received considerable attention and they are important in industry because of the need to increase reliability. This book is suitable for those who want to study feature-based intelligent machine fault diagnosis and prognosis techniques.

Modeling and Control of AC Machine using MATLAB®/SIMULINK

This book presents the main advanced signal processing techniques for fault detection and diagnosis in electromechanical systems. It focuses on presenting these advanced tools from time-frequency representation and time-scale analysis to demodulation techniques, including innovative and recently developed approaches.

Advanced Condition Monitoring and Fault Diagnosis of Electric Machines

Methods of diagnosis and prognosis play a key role in the reliability and safety of industrial systems. Failure diagnosis requires the use of suitable sensors, which provide signals that are processed to monitor features (health indicators) for defects. These features are required to distinguish between operating states, in order to inform the operator of the severity level, or even the type, of a failure. Prognosis is defined as the estimation of a systems lifespan, including how long remains and how long has passed. It also encompasses the prediction of impending failures. This is a challenge that many researchers are currently trying to address. *Electrical Systems*, a book in two volumes, informs readers of the theoretical solutions to this problem, and the results obtained in several laboratories in France, Spain and further afield. To this end, many researchers from the scientific community have contributed to this book to share their research results.

Induction Motor Fault Diagnosis

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.

Electrical Systems 1

Mass production companies have become obliged to reduce their production costs and sell more products with lower profit margins in order to survive in competitive market conditions. The complexity and automation level of machinery are continuously growing. This development calls for some of the most critical issues that are reliability and dependability of automatic systems. In the future, machines will be monitored remotely, and computer-aided techniques will be employed to detect faults in the future, and also there will be unmanned factories where machines and systems communicate to each other, detect their own faults, and can remotely intercept their faults. The pioneer studies of such systems are fault diagnosis studies. Thus, we hope that this book will contribute to the literature in this regard.

2019 IEEE Workshop on Electrical Machines Design, Control and Diagnosis (WEMDCD)

This book covers the diagnosis and assessment of the various faults which can occur in a three phase induction motor, namely rotor broken-bar faults, rotor-mass unbalance faults, stator winding faults, single phasing faults and crawling. Following a brief introduction, the second chapter describes the construction and operation of an induction motor, then reviews the range of known motor faults, some existing techniques for fault analysis, and some useful signal processing techniques. It includes an extensive literature survey to establish the research trends in induction motor fault analysis. Chapters three to seven describe the assessment of each of the five primary fault types. In the third chapter the rotor broken-bar fault is discussed and then two methods of diagnosis are described; (i) diagnosis of the fault through Radar analysis of stator current Concordia and (ii) diagnosis through envelope analysis of motor startup current using Hilbert and Wavelet Transforms. In chapter four, rotor-mass unbalance faults are assessed, and diagnosis of both transient and steady state stator current has been analyzed using different techniques. If both rotor broken-bar and rotor-mass unbalance faults occur simultaneously then for identification an algorithm is provided in this chapter. Chapter five considers stator winding faults and five different analysis techniques, chapter six covers diagnosis of single phasing faults, and chapter seven describes crawling and its diagnosis. Finally, chapter eight focuses on fault assessment, and presents a summary of the book together with a discussion of prospects for future research on fault diagnosis.

Fault Detection and Diagnosis

Find the Fault in the Machines Drawing on the author's more than two decades of experience with machinery condition monitoring and consulting for industries in India and abroad, Machinery Condition Monitoring: Principles and Practices introduces the practicing engineer to the techniques used to effectively detect and diagnose faults in machines. Providing the working principle behind the instruments, the important elements of machines as well as the technique to understand their conditions, this text presents every available method of machine fault detection occurring in machines in general, and rotating machines in particular. A Single-Source Solution for Practice Machinery Conditioning Monitoring Since vibration is one of the most widely used fault detection techniques, the book offers an assessment of vibration analysis and rotor-dynamics. It also covers the techniques of wear and debris analysis, and motor current signature analysis to detect faults in rotating mechanical systems as well as thermography, the nondestructive test NDT techniques (ultrasonics and radiography), and additional methods. The author includes relevant case studies from his own experience spanning over the past 20 years, and detailing practical fault diagnosis exercises involving various industries ranging from steel and cement plants to gas turbine driven frigates. While mathematics is kept to a minimum, he also provides worked examples and MATLAB® codes. This book contains 15 chapters and provides topical information that includes: A brief overview of the maintenance techniques

Fundamentals of machinery vibration and rotor dynamics Basics of signal processing and instrumentation, which are essential for monitoring the health of machines Requirements of vibration monitoring and noise monitoring Electrical machinery faults Thermography for condition monitoring Techniques of wear debris analysis and some of the nondestructive test (NDT) techniques for condition monitoring like ultrasonics and radiography Machine tool condition monitoring Engineering failure analysis Several case studies, mostly on failure analysis, from the author's consulting experience Machinery Condition Monitoring: Principles and Practices presents the latest techniques in fault diagnosis and prognosis, provides many real-life practical examples, and empowers you to diagnose the faults in machines all on your own.

Fault Diagnosis and Failure Prognosis of Electrical Machines

Although the most sophisticated fault diagnosis and condition monitoring systems have their origin in the aerospace and nuclear energy industries, their use is by no means restricted to such areas of 'high technology'. Modern machinery in most industrial plants is now so complex and expensive that mechanics find it increasingly difficult to detect failure by, for instance, recognising changes in sound 'signatures', and few plants can afford the luxury of regular 'stripping down'. Increasingly, therefore, eady-warning devices are being employed in an effort to prevent catastrophic breakdown. This book provides the first co-ordinated

compilation of fault diagnosis and condition monitoring devices. It proceeds in three logical steps. The early chapters deal with those conditions which contribute to deterioration and the consequent likely development of faults. The middle part of the book considers the various techniques of monitoring and discusses the criteria for their selection in different situations. The final chapters provide a guide to the interpretation of the information signals deriving from monitoring, relating to reliability science and the mathematics of probability, and thus providing decision data on which management can act.

Electrical Systems 2

This is the first comprehensive book which discusses numerous AI applications to electrical machines and drives. It presents a detailed and unified mathematical and physical treatment, and contains many worked examples, presents numerous simulation results and shows a large number of experimental results obtained on different DSP systems. It is essential reading for anyone interested in acquiring a solid background in AI-based electrical machines and drives, including students, teachers and other academics, and an industrial readership.

Condition Monitoring of Rotating Electrical Machines

WEMDCD focuses on state of the art research activities related to electrical machines and drives from both industry and academia

Detection and Diagnosis of Faults in Electrical Machines

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.

Diagnosis and Fault Tolerance of Electrical Machines and Power Electronics

This book presents a collection of the latest studies on and applications for the sustainable development of urban energy systems. Based on the 20th International Scientific Conference on Energy Management of Municipal Facilities and Sustainable Energy Technologies, held in Voronezh and Samara, Russia from 10 to 13 December 2018, it addresses a range of aspects including energy modelling, materials and applications in buildings; heating, ventilation and air conditioning systems; renewable energy technologies (photovoltaic, biomass, and wind energy); electrical energy storage; energy management; and life cycle assessment in urban systems and transportation. The book is intended for a broad readership: from policymakers tasked with evaluating and promoting key enabling technologies, efficiency policies and sustainable energy practices, to researchers and engineers involved in the design and analysis of complex systems.

Machinery Condition Monitoring

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.

Proceedings, 2019 IEEE Workshop on Electrical Machines Design, Control and Diagnosis (WEMDCD)

This book is a comprehensive, structural approach to fault diagnosis strategy. The different fault types, signal processing techniques, and loss characterisation are addressed in the book. This is essential reading for work with induction motors for transportation and energy.

2019 IEEE Workshop on Electrical Machines Design, Control and Diagnosis (WEMDCD)

This book constitutes the refereed proceedings of the 4th IFIP WG 5.5/SOCOLNET Doctoral Conference on Computing, Electrical and Industrial Systems, DoCEIS 2013, held in Costa de Caparica, Portugal, in April 2013. The 69 revised full papers were carefully reviewed and selected from numerous submissions. They cover a

wide spectrum of topics ranging from collaborative enterprise networks to microelectronics. The papers are organized in the following topical sections: collaborative enterprise networks; service orientation; intelligent computational systems; computational systems; computational systems applications; perceptual systems; robotics and manufacturing; embedded systems and Petri nets; control and decision; integration of power electronics systems with ICT; energy generation; energy distribution; energy transformation; optimization techniques in energy; telecommunications; electronics: devices design; electronics: amplifiers; electronics: RF applications; and electronics: applications.

Signal Processing for Fault Detection and Diagnosis in Electric Machines and Systems

Fault Diagnosis for Robust Inverter Power Drives focuses on early diagnosis, prognosis, and intrinsic reliability of inverter power drives and their applications. Topics include material degradation, materials, semiconductors, inverter topologies, and early diagnosis as well as fault tolerant software strategies.

Rotating Electrical Machines

This book introduces electrical machine modeling and control for electrical

engineering and science to graduate, undergraduate students as well as researchers, who are working on modeling and control of electrical machines. It targets electrical engineering students who have no time to derive mathematical equations for electrical machines in particular induction machine (IM) and doubly fed induction machines (DFIM). The main focus is on the application of field oriented control technique to induction motor (IM) and doubly fed induction motor (DFIM) in details, and since the induction motors have many drawback using this technique, therefore the application of a nonlinear control technique (feedback linearization) is applied to a reduced order model of DFIM to enhance the performance of doubly fed induction motor. Features Serves as text book for electrical motor modeling, simulation and control; especially modeling of induction motor and doubly fed induction motor using different frame of references. Vector control (field oriented control) is given in more detailed, and is applied to induction motor. A nonlinear controller is applied to a reduced model of an doubly induction motor associated with a linear observer to estimate the unmeasured load torque, which is used to enhance the performance of the vector control to doubly fed induction motor. Access to the full MATLAB/SIMULINK blocks for simulation and control.

Non-Destructive Testing

Design of Rotating Electrical Machines

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

This book presents papers covering a wide spectrum of theory and practice, deeply rooted in engineering problems at a high practical and theoretical level. The contents explore theory, control systems and applications, the heart of the matter in electrical drives.

Technological Innovation for the Internet of Things

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.

Control Methods for Electrical Machines

Non-destructive testing (NDT) is based on inspection methodologies that do not require the change or destruction of the component or system under evaluation. Numerous NDT techniques are increasingly used, thanks to the recent advances in sensing technologies, data acquisition, data storage and signal processing. Inspection information is widely employed in order to make effective maintenance decisions based on the defects identified, their location and severity. This book presents the main advances recently made on different NDT techniques, together with the principal approaches employed to process the signals obtained during inspection.

Introduction of Intelligent Machine Fault Diagnosis and Prognosis

AC motors play a major role in modern industrial applications. Squirrel-cage induction motors (SCIMs) are probably the most frequently used when compared to other AC motors because of their low cost, ruggedness, and low maintenance. The material presented in this book is organized into four sections, covering the applications and structural properties of induction motors (IMs), fault detection and diagnostics, control strategies, and the more recently developed topology based

on the multiphase (more than three phases) induction motors. This material should be of specific interest to engineers and researchers who are engaged in the modeling, design, and implementation of control algorithms applied to induction motors and, more generally, to readers broadly interested in nonlinear control, health condition monitoring, and fault diagnosis.

Electric Machines

As engineering processes are automated and manpower is reduced, condition monitoring of engineering plants has increased in importance. This is a first edition of this book, written by Taver & Penman was published in 1987. The economics of industry has now changed, as a result of the privatization and deregulation of the energy industry, placing far more emphasis on the importance of the reliable operation of a 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 analyze 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 plants. In this new book the original authors have been joined by Li Ran an expert in power electronics and control, and Sedding, an expert in the monitoring of electrical insulation systems. The first edition has been revised and

expanded merging the authors' own experience with that of machine analysts to bring it up-to-date.

Fault Diagnosis of Induction Motors

The type of control system used for electrical machines depends on the use (nature of the load, operating states, etc.) to which the machine will be put. The precise type of use determines the control laws which apply. Mechanics are also very important because they affect performance. Another factor of essential importance in industrial applications is operating safety. Finally, the problem of how to control a number of different machines, whose interactions and outputs must be coordinated, is addressed and solutions are presented. These and other issues are addressed here by a range of expert contributors, each of whom are specialists in their particular field. This book is primarily aimed at those involved in complex systems design, but engineers in a range of related fields such as electrical engineering, instrumentation and control, and industrial engineering, will also find this a useful source of information.

Fault Diagnosis for Robust Inverter Power Drives

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.

Fault-Diagnosis Applications

Methods of diagnosis and prognosis play a key role in the reliability and safety of industrial systems. Failure diagnosis requires the use of suitable sensors, which provide signals that are processed to monitor features (health indicators) for defects. These features are required to distinguish between operating states, in

order to inform the operator of the severity level, or even the type, of a failure. Prognosis is defined as the estimation of a systems lifespan, including how long remains and how long has passed. It also encompasses the prediction of impending failures. This is a challenge that many researchers are currently trying to address. Electrical Systems, a book in two volumes, informs readers of the theoretical solutions to this problem, and the results obtained in several laboratories in France, Spain and further afield. To this end, many researchers from the scientific community have contributed to this book to share their research results.

International Scientific Conference Energy Management of Municipal Facilities and Sustainable Energy Technologies EMMFT 2018

Induction Motors

The operation and analysis of different types of electrical machines and variable-speed drives is described in this book, using space-vector theory. The equations are arranged in forms that can be directly used for computation.

Condition Monitoring and Faults Diagnosis of Induction Motors

Supervision, condition-monitoring, fault detection, fault diagnosis and fault management play an increasing role for technical processes and vehicles in order to improve reliability, availability, maintenance and lifetime. For safety-related processes fault-tolerant systems with redundancy are required in order to reach comprehensive system integrity. This book is a sequel of the book “Fault-Diagnosis Systems” published in 2006, where the basic methods were described. After a short introduction into fault-detection and fault-diagnosis methods the book shows how these methods can be applied for a selection of 20 real technical components and processes as examples, such as: Electrical drives (DC, AC) Electrical actuators Fluidic actuators (hydraulic, pneumatic) Centrifugal and reciprocating pumps Pipelines (leak detection) Industrial robots Machine tools (main and feed drive, drilling, milling, grinding) Heat exchangers Also realized fault-tolerant systems for electrical drives, actuators and sensors are presented. The book describes why and how the various signal-model-based and process-model-based methods were applied and which experimental results could be achieved. In several cases a combination of different methods was most successful. The book is dedicated to graduate students of electrical, mechanical, chemical engineering and computer science and for engineers.

Artificial-Intelligence-based Electrical Machines and Drives

Performances of the PCA Method in Electrical Machines Diagnosis Using Matlab.

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