

A Sensorless Speed Estimation For Brushed Dc Motor At

Adaptive State Filtering with Neural Networks for Sensorless Induction Motor Speed Estimation
 AETA 2013: Recent Advances in Electrical Engineering and Related Sciences
 Advanced Control Systems for Electric Drives
 Handbook of Research on Emerging Technologies for Electrical Power Planning, Analysis, and Optimization
 Development of Adaptive Speed Observers for Induction Machine System Stabilization
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 STATE ESTIMATION TECHNIQUES FOR SPEED SENSORLESS FIELD ORIENTED CONTROL OF INDUCTION MOTORS.
 Sustainable Energy and Technological Advancements
 2019 IEEE 12th International Symposium on Diagnostics for Electrical Machines, Power Electronics and Drives (SDEMPED)
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 Speed-sensorless Estimation and Position Control of Induction Motors for Motion Control Applications
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Adaptive State Filtering with Neural Networks for Sensorless Induction Motor Speed Estimation CRC Press

This proceedings volume contains selected revised and extended research articles written by researchers who participated in the World Congress on Engineering and Computer Science 2015, held in San Francisco, USA, 21-23 October 2015. Topics covered include engineering mathematics, electrical engineering, circuits, communications systems, computer science, chemical engineering, systems engineering, manufacturing engineering, and industrial applications. The book offers the reader an overview of the state of the art in engineering technologies, computer science, systems engineering and applications, and will serve as an excellent reference work for researchers and graduate students working in these fields.

AETA 2013: Recent Advances in Electrical Engineering and Related Sciences Springer Nature
 This is a reprint in book form of the Energies MDPI Journal Special Issue, entitled "Energy Storage Systems and Power Conversion Electronics for E-Transportation and Smart Grid". The Special Issue was managed by two Guest Editors from Italy and Norway: Professor Sergio Saponara from the University of Pisa and Professor Lucian MIHET-POPA from Østfold University College, in close cooperation with the Editors from Energies. The papers published in this SI are related to the emerging trends in energy storage and power conversion electronic circuits and systems, with a specific focus on transportation electrification, and on the evolution from the electric grid to a smart grid. An extensive exploitation of renewable energy sources is foreseen for the smart grid, as well as a close integration with the energy storage and recharging systems of the electrified transportation era. Innovations at the levels of both algorithmic and hardware (i.e., power converters, electric drives, electronic control units (ECU), energy storage modules and charging stations) are proposed. Research and technology transfer activities in energy storage systems, such as batteries and super/ultra-capacitors, are essential for the success of electric transportation, and to foster the use of renewable energy sources. Energy storage systems are the key technology to solve these issues, and to increase the adoption of renewable energy sources in the smart grid.

Advanced Control Systems for Electric Drives Oxford University Press
 This thesis presents different state estimation techniques for speed sensorless field oriented control of induction motors. The theoretical basis of each algorithm is explained in detail and its performance is tested with simulations and experiments individually. First, a stochastic nonlinear state estimator, Extended Kalman Filter (EKF) is presented. The motor model designed for EKF application involves rotor speed, dq-axis rotor fluxes and dq-axis stator currents. Thus, using this observer the rotor speed and rotor fluxes are estimated simultaneously. Different from the widely accepted use of EKF, in which it is optimized for either steady-state or transient operations, here using adjustable noise level process algorithm the optimization of EKF has been done for both states.

Handbook of Research on Emerging Technologies for Electrical Power Planning, Analysis, and Optimization Springer

Telecommunications and Signal Processing Power Engineering Control Systems Engineering Computer Engineering and applications

Development of Adaptive Speed Observers for Induction Machine System Stabilization MDPI
 The two-volume set LNAI 8856 and LNAI 8857 constitutes the proceedings of the 13th Mexican International Conference on Artificial Intelligence, MICAI 2014, held in Tuxtla, Mexico, in November 2014. The total of 87 papers plus 1 invited talk presented in these proceedings were carefully reviewed and selected from 348 submissions. The first volume deals with advances in human-inspired computing and its applications. It contains 44 papers structured into seven sections: natural

language processing, natural language processing applications, opinion mining, sentiment analysis, and social network applications, computer vision, image processing, logic, reasoning, and multi-agent systems, and intelligent tutoring systems. The second volume deals with advances in nature-inspired computation and machine learning and contains also 44 papers structured into eight sections: genetic and evolutionary algorithms, neural networks, machine learning, machine learning applications to audio and text, data mining, fuzzy logic, robotics, planning, and scheduling, and biomedical applications.

Modern Electrical Drives Springer Science & Business Media

Permanent magnet synchronous motors (PMSM) are used commonly in numerous industrial applications, for instance, in mechatronics, vacuum pumps, energy storage flywheels, automotive, centrifugal compressors, and robotics. Nowadays, the sensorless speed control of PMSM is getting more attention, and several studies are progressing because of its low cost and reliable features. Normally, the speed control methods in PMSM are achieved with the help of sensors for position or speed estimation and control. But, these sensors are easily prone to breakage. Also, the flexibility towards parameter variations is poor in the conventional speed control methods. So, a sensorless T-source inverter-based PMSM drive that integrates the Proportional Integral (PI) controller with an adaptive mechanism to cope with the time-varying system parameters is proposed in this article. A sensorless module, namely, a model reference adaptive system (MRAS), is employed to estimate the rotor position of PMSM based on its performance characteristics. Simulation results are illustrated to investigate the performance of the proposed method with different speeds under no load and loaded conditions. Moreover, the proposed approach not only minimizes the cost and size of the motor but also maximizes the reliability and accuracy.

STATE ESTIMATION TECHNIQUES FOR SPEED SENSORLESS FIELD ORIENTED CONTROL OF INDUCTION MOTORS. Sensorless Speed Estimation of an Induction Motor
 Sensorless Speed Estimation of an Induction Motor
 Flux and Speed Estimation Techniques for Sensorless Control of Induction Motors
 Abstract: The focus of this research is the development of novel techniques for estimation and control of sensorless induction motor drives. In a sensorless drive, the speed must be estimated from the system measurements. Depending on the objective of the control (speed or torque control), the speed estimate must be used in one or more areas of the control scheme. This idea and the main techniques for speed estimation are explored. The dissertation investigates the issues related to low-speed flux estimation when a Voltage Model observer is used. Pure integration cannot be implemented due to offsets in the measured signals and integrators must be replaced by low pass filters. At low speed, the flux estimates are incorrect in both magnitude and angle; consequently, the rotor position obtained by the DFO method is incorrect. An improved Voltage Model observer that corrects the errors is developed based on a Programmable Low Pass Filter and a vector rotator. The method requires estimation of the stator frequency and this is done by a Phase Locked Loop synchronized with the voltage vector. The traditional rotor flux MRAS method can be used for speed estimation, however, under non-ideal integration the dynamics of the speed estimate exhibits right-hand side plane zeros. Additionally, system tuning is difficult and may yield under damped responses. Two novel Sliding Mode MRAS observers are designed and implemented and their features are used for speed estimation. The d-q rotational frame currents of an induction machine are not decoupled. Decoupling can be achieved by canceling the cross-coupled terms in the equations of the synchronous frame currents. This approach is both inconvenient and inaccurate. A novel approach for decoupling is presented: an Integral Sliding Mode controller complements a traditional controller that acts on a simulated plant. The use of the Integral SM controller guarantees that the currents in the real plant will track those of the simulated model. The additional controller compensates for the cross-terms and for variations of the machine parameters. The method is also valuable for allowing fast and efficient tuning of the current controllers.
 Sensorless Speed Estimation of an Induction Motor
 Motor speed estimation with sensorless vectorial control, employing an

extended kalman filter with estimation of the covariance of the noises Este trabalho apresenta uma solução para a estimação da velocidade do motor de indução quando é aplicado um controle vetorial sem sensor sensorless, utilizando o filtro estendido de Kalman com um filtro secundário, inovador, que proporciona os valores ótimos das matrizes de covariância e pode trabalhar em forma on-line. AETA 2013: Recent Advances in Electrical Engineering and Related Sciences

Este trabalho propõe uma análise comparativa do desempenho de técnicas de controle e estimação de velocidade, com realização discreta no tempo, aplicadas a motores de indução trifásicos, utilizando plataforma com base em um processador digital de sinais de ponto-fixado. Algumas modificações em algoritmos existentes na literatura são propostas para melhorar o desempenho das técnicas em estudo. Inicialmente, uma revisão histórica sobre a evolução dos sistemas de acionamento para motores de corrente alternada e uma revisão bibliográfica das principais técnicas de estimação de velocidade implementadas em DSP são realizadas. Em seguida, são obtidos diferentes modelos para o motor de indução trifásico representados em referenciais semi-estacionários. A partir do modelo da máquina foram projetados dois controladores de velocidade: um controlador clássico e amplamente utilizado no meio industrial (PI), e, com o objetivo de compensar distúrbios e dinâmicas não modeladas, um controlador adaptativo robusto por modelo de referência (RMRAC) é implementado. Para o projeto de servomecanismos sensorless de alto desempenho, duas técnicas de estimação de velocidade baseadas no modelo do MI foram selecionadas. Uma delas é amplamente difundida, no meio acadêmico e industrial, sendo fundamentada em um sistema adaptativo por modelo de referência (MRAS) e outra tem base em um algoritmo de mínimos quadrados recursivos modificado (MRLS) e é apresentada como uma alternativa de alto desempenho. No desenvolvimento deste trabalho, resultados de simulações utilizando o software Matlab®, simulações em tempo-real em plataforma DSP, e por fim, resultados experimentais são apresentados. A partir destes resultados, parte-se para avaliação para determinar quais dos controladores sensorless analisados apresentam resposta dinâmica satisfatória em uma larga faixa de velocidade, inclusive em condições de velocidade baixa e nula, e também diante de situações de variação de carga e de parâmetros.

[Sustainable Energy and Technological Advancements](#) Springer Nature

Electrical drives lie at the heart of most industrial processes and make a major contribution to the comfort and high quality products we all take for granted. They provide the controller power needed at all levels, from megawatts in cement production to milliwatts in wrist watches. Other examples are legion, from the domestic kitchen to public utilities. The modern electrical drive is a complex item, comprising a controller, a static converter and an electrical motor. Some can be programmed by the user. Some can communicate with other drives. Semiconductor switches have improved, intelligent power modules have been introduced, all of which means that control techniques can be used now that were unimaginable a decade ago. Nor has the motor side stood still: high-energy permanent magnets, semiconductor switched reluctance motors, silicon micromotor technology, and soft magnetic materials produced by powder technology are all revolutionising the industry. But the electric drive is an enabling technology, so the revolution is rippling throughout the whole of industry.

[2019 IEEE 12th International Symposium on Diagnostics for Electrical Machines, Power Electronics and Drives \(SDEMPED\)](#) Springer Nature

This book describes the development of an adaptive state observer using a mathematical model to achieve high performance for sensorless induction motor drives. This involves first deriving an expression for a modified gain rotor flux observer with a parameter adaptive scheme to estimate the motor speed accurately and improve the stability and performance of sensorless vector-controlled induction motor drives. This scheme is then applied to the controls of a photovoltaic-motor water-pumping system, which results in improved dynamic performance under different operating conditions. The book also presents a robust speed controller design for a sensorless vector-controlled induction motor drive system based on H_∞ theory, which overcomes the problems of the classical controller.

[Control of Permanent Magnet Synchronous Motors](#) John Wiley & Sons

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 Linear Machines and Drive Systems](#) John Wiley & Sons

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.

[T-Source Inverter-Based Sensorless Speed Control for Permanent Magnet Synchronous Motor](#) IGI Global

As the demand for efficient energy sources continues to grow around the globe, electrical systems are becoming more essential in an effort to meet these increased needs. As these systems are being utilized more frequently, it becomes imperative to find ways of optimizing their overall function. The Handbook of Research on Emerging Technologies for Electrical Power Planning, Analysis, and Optimization features emergent methods and research in the systemic and strategic planning of energy usage. Highlighting theoretical perspectives and empirical research, this handbook is a comprehensive reference source for researchers, practitioners, students, and professionals interested in the current advancements and efficient use in power systems.

[Speed Sensorless Induction Motor Drives for Electrical Actuators: Schemes, Trends and Tradeoffs](#) Springer Nature

Induction motors are the most important workhorses in industry. They are mostly used as constant-speed drives when fed from a voltage source of fixed frequency. Advent of advanced power electronic converters and powerful digital signal processors, however, has made possible the development of high performance, adjustable speed AC motor drives. This book aims to explore new areas of induction motor control based on artificial intelligence (AI) techniques in order to make the controller less sensitive to parameter changes. Selected AI techniques are applied for different induction motor control strategies. The book presents a practical computer simulation model of the induction motor that could be used for studying various induction motor drive operations. The control strategies explored include expert-system-based acceleration control, hybrid-fuzzy/PI two-stage control, neural-network-based direct self control, and genetic algorithm based extended Kalman filter for rotor speed estimation. There are also chapters on neural-network-based parameter estimation, genetic-algorithm-based optimized random PWM strategy, and experimental

investigations. A chapter is provided as a primer for readers to get started with simulation studies on various AI techniques. Presents major artificial intelligence techniques to induction motor drives Uses a practical simulation approach to get interested readers started on drive development Authored by experienced scientists with over 20 years of experience in the field Provides numerous examples and the latest research results Simulation programs available from the book's Companion Website This book will be invaluable to graduate students and research engineers who specialize in electric motor drives, electric vehicles, and electric ship propulsion. Graduate students in intelligent control, applied electric motion, and energy, as well as engineers in industrial electronics, automation, and electrical transportation, will also find this book helpful. Simulation materials available for download at www.wiley.com/go/chanmotor

[Electric Machines and Drives](#) MDPI

The proceedings covers advanced and multi-disciplinary research on design of smart computing and informatics. The theme of the book broadly focuses on various innovation paradigms in system knowledge, intelligence and sustainability that may be applied to provide realistic solution to varied problems in society, environment and industries. The volume publishes quality work pertaining to the scope of the conference which is extended towards deployment of emerging computational and knowledge transfer approaches, optimizing solutions in varied disciplines of science, technology and healthcare.

[Transactions on Engineering Technologies](#) Springer Science & Business Media

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](#) Springer Science & Business Media

Sensorless speed detection of an induction motor is an attractive area for researchers to enhance the reliability of the system and to reduce the cost of the components. This paper presents a simple method of estimating a rotational speed by utilizing an artificial neural network (ANN) that would be fed by a set of stator current frequencies that contain some saliency harmonics. This approach allows operators to detect the speed in induction motors such an approach also provides reliability, low cost, and simplicity. First, the proposed method is based on converting the stator current signals to the frequency domain and then applying a tracking algorithm to the stator current spectrum in order to detect frequency peaks. Secondly, the ANN has to be trained by the detected peaks; the training data must be from very precise data to provide an accurate rotor speed. Moreover, the desired output of the training is the speed, which is measured by a tachometer simultaneously with the stator current signal. The databases were collected at many different speeds from two different types of AC induction motors, wound rotor and squirrel cage. They were trained and tested, so when the difference between the desired speed value and the ANN output value reached the wanted accuracy, the system does not need to use the tachometer anymore. Eventually, the experimental results show that in an optimal ANN design, the speed of the wound rotor induction motor was estimated accurately, where the testing average error was 1 RPM. The proposed method has not succeeded to predict the rotor speed of the squirrel cage induction motor precisely, where the smallest testing average error that was achieved was 5 RPM.

[Sensorless Speed Estimation of an Induction Motor](#) Springer

Speed estimation is one of the methods of speed sensor-less control for three phase induction motors. With the advancement of the power electronics switching devices and digital technologies, the developments of speed estimation methods have been intensively implemented from many researchers. Thus, this field of research has become more interested to investigate. Speed sensor-less control techniques can make the hardware simple and improve the reliability of the motor without the introducing the feedback sensor and it becomes more important in the modern AC servo drive. It is one of the attracting research directions in the high-precision servo control field because of its robust characteristics, simple realization and excellent dynamic response. Several common rotor speed estimation was introduced in the thesis. The model must accurately represent both the electrical and electromagnetic interactions within the machine and associated mechanical systems. In this Thesis, the neural networks controller for speed estimation has been developed approach to induction motor that has been implemented in digital signal processing controller (DSP) and gave the control signal to IGBT for run three phase inductions motor. Analysis of speed estimation nonlinear characteristics is carried out and makes a comparison with traditional linear method speed sensor less method. First, the simulation of the proposed control system is performed by using the MATLAB software and then the real time implementation is performed by using the MATLAB and the hardware. According to the mathematical model of the induction motor, the simulation of model and hardware implementation of speed sensor-less induction motor had been successfully implemented. The design and implementation of the speed estimation system for three-phase induction motor and the experimental research is presented in this Thesis. Finally, this Thesis shows the implementation of the speed estimation using DSP controller and the design of hardware and software for speed sensorless of induction motor. The experiment is completed at different speed and experiment results show that artificial neural network controller obtained a good response when compared to conventional methods.

[Sensorless Speed Estimation of an Induction Motor](#) BoD - Books on Demand

CoDIT is a forum for technical exchange amongst scientists having interests in Control, Optimization, Decision, all areas of Engineering, Computer Science and Information Technologies

[World Congress on Engineering and Computer Science 2015](#) Springer

The subject of this book is an important and diverse field of electric machines and drives. The twelve chapters of the book written by renowned authors, both academics and practitioners, cover a large part of the field of electric machines and drives. Various types of electric machines, including three-phase and single-phase induction machines or doubly fed machines, are addressed. Most of the chapters focus on modern control methods of induction-machine drives, such as vector and direct torque control. Among others, the book addresses sensorless control techniques, modulation strategies, parameter identification, artificial intelligence, operation under harsh or failure conditions, and modelling of electric or magnetic quantities in electric machines. Several chapters give an insight into the problem of minimizing losses in electric machines and increasing the overall energy efficiency of electric drives.

[Sensorless Speed Estimation of an AC Induction Motor by Using an Artificial Neural Network Approach](#) Springer

Este trabalho apresenta uma solução para a estimação da velocidade do motor de indução quando é

aplicado um controle vetorial sem sensor sensorless, utilizando o filtro estendido de Kalman com um filtro secundário, inovador, que proporciona os valores ótimos das matrizes de covariância e pode trabalhar em forma on-line.

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