Speed Control Of Three Phase Ac Induction Motor Using Svm

Conventional controllers like the proportional integral differential (PID) would have being very effective not just for speed control alone, if not for some complexities with individually controlling its respective controllers and summing up their individual contributions to effectively yield controlled signal output. Also, for its insensitivity to changes made to model parameters which may be as a result of misrepresentation of some control variables. As a result of this, developing an intelligent based fuzzy logic controller (FLC) became eminent, and on this basis, this book is written. By varying the motor speed with input reference speed, an error signal and a feedback loop is generated. The FLC then operates on the principles of mapping with corrective measure of the error signal generated and it is regulated by sets of IF-THEN rules integrating the Mamdani fuzzy inference approach. The rules projected and formed are used to overcome the drawbacks of conventional controllers. Since induction motors are widely used in many industries today, most especially squirrel caged, an intelligent approach to the control of these motors will save cost, increase reliability and efficiency

The three-phase squirrel-cage induction motor is rugged, compact, inexpensive, can be totally enclosed and requires little maintenance. Its use as a variable speed drive has been limited, however, by the state-of-the art of control components. The advent and continuing development of the silicon controlled rectifier and associated solid-state components has provided the technology for conceiving a static frequency converter to allow continuous motor speed adjustment over a wide range. The static frequency converter system adjusts the motor input frequency and voltage so the motor can match a given load speed-torque requirement. The high cost and low thermal overload capabilities of the solidstate components required for a prototype dictate the use of modeling and simulation techniques for analysis of complex systems such as the static frequency converter motor speed control system.

The importance of electric motors is well known in the various engineering fields. The book provides comprehensive coverage of the various types of electric motors including d.c. motors, three phase and single phase induction motors, synchronous motors, universal motor, a.c. servomotor, linear induction motor and stepper motors. The book covers all the details of d.c. motors including torque equation, back e.m.f., characteristics, types of starters, speed control methods and applications. The book also covers the various testing methods of d.c. motors such as Swinburne's test, brake test, retardation test, field test and Hopkinson's test. The book further explains the three phase induction motors in detail. It includes the production of rotating magnetic field, construction, working, effect of slip, torque equation, torque ratios, torque-slip characteristics, losses, power flow, equivalent circuit, effect of harmonics on the performance, circle diagram and applications. This chapter also includes the discussion of induction generator. The book teaches the various starting methods and speed control methods of three phase induction motors. The book incorporates the explanation of various single phase induction motors. The chapter on synchronous motor provides the detailed discussion of construction, working principle, behavior on load, analysis of phasor diagram, Vee and Inverted Vee curves, hunting, synchronous condenser and applications. The book also teaches the various special machines such as single phase commutator motors, universal motor, a.c. servomotor, linear induction motor and stepper motors. The book uses plain, lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. Each chapter is well supported with necessary illustrations, self explanatory diagrams and variety of solved problems. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

Efficiency and Speed Control of Three-phase Induction Motors
Power Electronics Handbook
Three Phase Inverter for Induction Motor Speed Control
Speed Control of Three Phase Induction Motor Using Saturable Reactors in the Stator Circuit
ELECTRICAL MACHINES
The Asymmetrical Dual Three-Phase Induction Machine and the MBPC in the Speed Control.
An electric machine is a device that converts mechanical energy into electrical energy or vice versa. It can take the form of an electric generator, electric motor, or transformer. Electric generators produce virtually all electric power we use all over the world. Electric machine blends the three major areas of electrical engineering: power, control and power electronics. This book presents the relation of power quantities for the machine as the current, voltage power flow, power losses, and efficiency. This book will provide a good understanding of the behavior and its drive, beginning with the study of salient features of electrical dc and ac machines.
The conference aims to provide a premier platform for Engineers, researchers, scientists and academicians to present their work in the emerging areas such as Renewable Energy, Energy storage, Power Electronics & drives, Smart devices and communication systems, Artificial Intelligence, Robotics, Networks an IoT, Control and automation etc.
A Step towards Smarter Earth
Speed Control of Three Phase Ac Induction Motor Using Svm
Construction, Performance, Speed Control, Starting, Braking Space Harmonics & Design of Three Phase Induction Motors
S.C.R. Speed Control of Three-phase Squirrel-cage Induction Motors
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Power electronics, which is a rapidly growing area in terms of research and applications, uses modern electronics technology to convert electric power from one form to another, such as ac-dc, dc-dc, dc-ac, and ac-ac with a variable output magnitude and frequency. Power electronics has many applications in our every day life such as air-conditioners, electric cars, sub-way trains, motor drives, renewable energy sources and power supplies for computers. This book covers all aspects of switching devices, converter circuit topologies, control techniques, analytical methods and some examples of their applications. * 25% new content * Reorganized and revised into 8 sections comprising 43 chapters * Coverage of numerous applications, including uninterruptable power supplies and automotive electrical systems * New content in power generation and distribution, including solar power, fuel cells, wind turbines, and flexible transmission

Artificial intelligence has been applied to many areas of science and technology, including the power and energy sector. Renewable energy in particular has experienced the tremendous positive impact of these developments. With the recent evolution of smart energy technologies, engineers and scientists working in this sector need an exhaustive source of current knowledge to effectively cater to the energy needs of citizens of developing countries. Computational Methodologies for Electrical and Electronics Engineers is a collection of innovative research that provides a complete insight and overview of the application of intelligent computational techniques in power and energy. Featuring research on a wide range of topics such as artificial neural networks, smart grids, and soft computing, this book is ideally designed for programmers, engineers, technicians, ecologists, entrepreneurs, researchers, academicians, and students.

Electrical and instrumentation engineering is changing rapidly, and it is important for the veteran engineer in the field not only to have a valuable and reliable reference work which he or she can consult for basic concepts, but also to be up to date on any changes to basic equipment or processes that might have occurred in the field. Covering all of the basic concepts, from three-phase power supply and its various types of connection and conversion, to power equation and discussions of the protection of power system, to transformers, voltage regulation, and many other concepts, this volume is the one-stop, "go to" for all of the engineer's questions on basic electrical and instrumentation engineering. There are chapters covering the construction and working principle of the DC machine, all varieties of motors, fundamental concepts and operating principles of measuring, and instrumentation, both from a "high end" point of view and the point of view of developing countries, emphasizing low-cost methods. A valuable reference for engineers, scientists, chemists, and students, this volume is applicable to many different fields, across many different industries, at all levels. It is a must-have for any library.

Speed Control of Three-phase Induction Motors
Centrifugal Pump Handbook
Basic Electrical & Instrumentation Engineering
Recent Advances in Power Electronics and Drives
Devices, Circuits and Applications
Offers key concepts of electrical machines embedded with solved examples, review questions, illustrations and open book questions.
This comprehensive, up-to-date introduction to Electrical Machines is designed to meet the needs of undergraduate electrical engineering students. It presents the essential principles of rotating machines and transformers. The emphasis is on the performance, though the book also introduces the salient features of electrical machine design. The book provides accessible, student-friendly coverage of dc machines, transformers, three-phase induction motor, single-phase induction motor, fractional horsepower motors, and synchronous machines. The clear writing style of the book enhanced by illustrative figures and simplified explanations of the fundamentals, makes it an ideal text for gaining a thorough understanding of the subject of electrical machines. Key Features Include: •Detailed coverage of the construction of electrical machines. •Lucid explanations of the principles of operation of electrical machines. •Methods of testing of electrical machines. •Performance calculations of electrical machines. •Wealth of diverse solved examples in each chapter to illustrate the application of theory to practical problems. •Salient features of design of electrical machines. •Objective type questions to help students prepare for competitive exams.
Efficiency and Speed Control of Three-phase Induction MotorsSpeed Control of Three-phase Induction MotorsSpeed Control of Three Phase Ac Induction Motor Using SvmCreatespace Independent Publishing Platform
Utilisation of Electrical Power
Vector Control of Three-Phase AC Machines
Analysis and Performance of a Three-phase Induction Motor in the Presence of a Compensator and Speed Controller with Regard to Power Factor Compensation Braking Performance and Motor Variation
The Asymmetrical Dual Three-Phase Induction Machine and the MBPC in the Speed Control
System Development in the Practice
All the experience of the research team from one of the world's foremost pump manufacturers - Sulzer, featuring the lastest in pump design and construction.
A Textbook of Mechatronics is a comprehensive textbook for the students of Mechanical Engineering and a mustbuy for the aspirants of different entrance examinations including GATE and UPSC. Divided into 10 chapters, the book delves into the subject beginning from Basic Concepts and goes on to discuss elements of CNC Machines and Robotics. The book also becomes useful as a question bank for students as it offers university questions with answers.
This long-awaited new edition is the complete reference for engineers and designers working on pump design and development or using centrifugal pumps in the field. This authoritative guide has been developed with access to the technical expertise of the leading centrifugal pump developer, Sulzer Pumps. In addition to providing the most comprehensive centrifugal pump theory and design reference with detailed material on cavitation, erosion, selection of materials, rotor vibration behavior and forces acting on pumps, the handbook also covers key pumping applications topics and operational issues, including operating performance in various types of circuitry, drives and acceptance testing. Enables readers to understand, specify and utilise centrifugal pumps more effectively, drawing on the industry-leading experience of Sulzer Pumps, one of the world's major centrifugal pump developers Covers theory, design and operation, with an emphasis on providing first class quality and efficiency solutions for high capital outlay pump plant users Updated to cover the latest design and technology developments, including applications, test and reliability procedures, cavitation, erosion, selection of materials, rotor vibration behaviour and operating performance in various types of circuitry
A Text Book of Electrical Machines
A Static Frequency Converter Speed Control System for the Three-phase Squirrel-cage Induction Motor
Speed Control of Three-phase Induction Motor Using Variable Frequency Drive
Speed Control of Wound-rotor Induction Motor with Rotor Impedance Control
Power Electronics and Motor Control

Abstract: There are various methods for speed control of induction motors. This paper specifically describes one of the methods: speed control using variable frequency. The proposed system is a MATLAB simulink model, which is a closed loop model designed to achieve desired speed control of a three-phase induction motor by varying its frequency. The simulink model has four main blocks, namely the inverter, synchronous machine, proportional integral control and current hysteresis control. For accuracy of output results and simplicity, we have used dq to abc transformation block and sin function block. The inverter is comprised of six integrated gate bipolar transistors (IGBTs), which are fired by gate pulses generated by current hysteresis control block. The inverter generates variable frequency and variable voltage output, which is given to motor terminals. The project presents the working principle of variable frequency drive (VFD), its performance, and the use of Pulse Width Modulation (PWM) in a three-phase inverter to control the frequency and thus the speed. The proposed method conformed to performance predictions and delivered the desired outputs.
The development of induction motor controller project is a part of three phase induction motor control system that will be designed based on microcontroller using MC68HC908MR32 integrated circuit manufactured by Motorola. This controller board is an integral part of embedded motion control series and will be interface with power circuit stage, optoisolator and emulator as one system to control a three phase induction motor speed by controlling the PWM output using microcontroller program. The controlled PWM output then will be transfer to power circuit board that consist of power inverter switching to control the speed of the three phase motor. This method is called V/F control method. This control board is equipped with overcurrent circuit sensor to detect fault for safety purpose and tachometer circuit to sense motor speed. This control board also have forward/reverse switch, start/stop switch and speed control pot.
This book "Three Phase Asynchronous Motors" covers construction, performance, starting, braking, speed control, space harmonics and design of three phase induction motors. The simplicity to a great extent in explaining each subject and the concentration on the different enough examples are the features that have been adopted in developing the text material. Moreover, there are tutorial problems and different review answered questions for revision. Thus, this book has been written to meet the introductory phase of the needs of those students and engineers who are interested in 3-phase induction motors and its applications. The book text material divides itself into five Chapters: The first Chapter is designated to construction and performance of three phase induction motors. The second be allocated to speed control of three phase induction motors. The third Chapter is devoted to 3-phase induction motors starting and electric braking. The fourth Chapter is devoted to space harmonics in 3-phase induction motors. The fifth one is devoted to 3-phase induction motors design.
Fuzzy Logic Based Speed Control of Three-Phase Induction Motor Drive
Development of Three Phase Induction Motor Controller
Distributed Speed Control for Multi-three-phase Motors with Enhanced Power Sharing Capabilities
Microprocessor-based PWM Controller for Variable-speed Control of a Three Phase Induction Motor Driven Wheelchair
Microprocessor Control of a Three Phase Induction Motor Speed Control

Three-phase induction motors have been used in a wide range of industry applications; since they are robust, brushless and have simple design. Furthermore, the speed of induction motor can be easily controlled by variable frequency drives. The continuous development in power electronics semiconductors came out with modern electric drives. These drives use high speed power transistors, like IGBT and MOSFET, with various switching techniques. The speed control of induction motor is important to achieve maximum torque and efficiency. In the past decades, conventional control systems, such as proportional-integral derivative (PID) controller, were applied to electric drives to control the speed of induction motor. The PID controller is not a well established control method in motor drive because of the nonlinearity of induction motor. On the other hand, the use of Fuzzy Logic Controller (FLC) improves the performance of the speed control of induction motor. In this research, a microcontroller-based fuzzy logic controller was developed. The FLC replaces the conventional PI controller to improve the speed response of the drive in order to keep the speed of the induction motor constant when the load varies within the operating range. The research also included the design and implementation of a three-phase voltage source inverter (VSI) driven by Space Vector Pulse Width Modulation (SVPWM) signal. The control system in this research was designed using Matlab/Simulink environment. The simulation included a comparison of speed response of FLC and PI controller. The input to FLC is the linguistic variable of speed error and change of speed error, while the output of FLC is the frequency fed to the inverter. The three-phase inverter was fabricated using MOSFET Hex-bridge connected to a low-pass LC-filter to smooth the inverter output voltage wave. In order to apply FLC and generate corresponding SVPWM signals a PIC16F877A microcontroller was used in the control system. The speed controller was tested using various values of input speed using simulation and experiments. The results showed the superiority of the proposed FLC over the conventional PI controller in the dynamics response of speed. The results also showed the ability of the proposed to generate a three-phase sine wave with desired frequency to control the speed of the induction motor with THD less than 5%.

The book covers all the aspects of Basic Electrical and Instrumentation Engineering for undergraduate course. Various concepts of three phase a.c. circuit analysis with balanced and unbalanced loads, tariff and power factor improvement, single phase and three phase transformers, d.c. machines, single phase and three phase induction motors, alternators, synchronous motors, basics of measuring instruments and transducers are explained in the book with the help of comprehensive approach. The book starts with explaining the three phase a.c. circuit analysis with balanced and unbalanced loads, concept of transmission, distribution and power system protection. The discussion of tariff and power factor improvement is also added in support. The book further explains single phase and three phase transformers. Then book provides the detailed discussion of d.c. generators and motors. The book also includes the discussion of three phase and single phase induction motors, synchronous generators, synchronous motors and other motors such as stepper motor, brushless d.c. motor and universal motor. The book covers the classification and basic requirements of a measuring instrument. Then the book explains the static and dynamic characteristics and types of errors in measuring instruments. The book provides in depth discussion of electronic multimeter and oscilloscope. The book teaches the details of various types of transducers like resistive, inductive, capacitive, thermoelectric, piezoelectric, photoelectric and Hall effect transducers. The book uses plain, simple and lucid language to explain each topic. Each chapter gives the conceptual knowledge about the topic dividing it in the various sections and subsections. Each chapter provides the detailed explanation of the topic, practical examples and variety of solved problems. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

This clear and concise advanced textbook is a comprehensive introduction to power electronics.
The Efficiency of 3 Phase Induction Motor Under (PWM) Speed Control
Power Factor Compensation and Speed Control of Three-phase Induction Motor
Fundamentals of Electric Machines: A Primer with MATLAB
Robotics And Industrial Automation
THEORY AND PRACTICE
The project we have chosen to implement "Space Vector Modulation" is very important form industrial point of view. It is not uncommon to control the speed of induction motors according to the load demand attached with the motor. There are different techniques to fulfill this demand. Most common techniques are PWM techniques. Every PWM technique has its own advantage and sometimes drawback. So we, the group members, have implemented a control for induction motor which can control the speed of motor very effectively and efficiently. SVM is different from other conventional PWM techniques in that it sees the inverter as a single unit and results in high efficiency, high reliability, smoother operation, higher fundamental output voltage. So this technique is preferred over the other techniques due to its desirable features.
This book addresses the vector control of three-phase AC machines, in particular induction motors with squirrel-cage rotors (IM), permanent magnet synchronous motors (PMSM) and doubly-fed induction machines (DFIM), from a practical design and development perspective. The main focus is on the application of IM and PMSM in electrical drive systems, where field-orientated control has been successfully established in practice. It also discusses the use of grid-voltage oriented control of DFIMs in wind power plants. This second, enlarged edition includes new insights into flatness-based nonlinear control of IM, PMSM and DFIM. The book is useful for practitioners as well as development engineers and designers in the area of electrical drives and wind-power technology. It is a valuable resource for researchers and students.
Electric Motors
Microcontroller-based Fuzzy Logic Speed Controller for Three-phase Induction Motor
Basic Electrical and Instrumentation Engineering
Speed Control of a Three-phase Induction Motor by a Thyratron Inverter

Sulzer Centrifugal Pump Handbook