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RELUCTANCE SYNCHRONOUS MACHINES AND DRIVES

I. BOLDEA



Reluctance Synchronous Machines And Drives

Yi-Tong Ma



Reluctance Synchronous Machines And Drives:

Reluctance Synchronous Machines and Drives Ion Boldea, 2023

Reluctance Synchronous Machines and Drives I. Boldea, 1996 Reluctance synchronous machines RSMs and drives include a multitude of machine topologies in terms of rotor stator windings and stator current control Line start constant speed and inverter fed variable speed applications are easily achieved in a power range from a few hundred watts to megawatts RSMs offer strong competition to existing variable speed brushless drives for applications from computer peripherals through robotics to electric traction for rail transport This book explores fully the possible topologies their characteristics and applications *The Rediscovery of Synchronous Reluctance and Ferrite Permanent Magnet Motors* Gianmario Pellegrino, Thomas M. Jahns, Nicola Bianchi, Wen L. Soong, Francesco Cupertino, 2016-04-28 This book offers an essential compendium on the analysis and design of synchronous motors for variable speed applications Focusing on synchronous reluctance and ferrite permanent magnet PM synchronous reluctance machines it provides a broad perspective on three phase machines for variable speed applications a field currently dominated by asynchronous machines and rare earth PM synchronous machines It also describes synchronous reluctance machines and PM machines without rare earth materials comparing them to state of the art solutions The book provides readers with extensive information on and finite element models of PM synchronous machines including all relevant equations and with an emphasis on synchronous reluctance and PM assisted synchronous reluctance machines It covers ferrite assisted machines modeled as a subcase of PM assistance fractional slot combinations solutions and a quantitative normalized comparison of torque capability with benchmark PM machines The book discusses a wealth of techniques for identifying machine parameters with an emphasis on self commissioning algorithms and presents methods for automated machine design and optimization including a software tool developed for this purpose Addressing an important gap in the field of PM less and less PM electrical machines it is intended as a self contained reference guide for both graduate students and professional machine designers and as a useful text for university courses on automated and or optimized design of electrical machines and drives

Linear Electric Machines, Drives, and MAGLEVs Handbook Ion Boldea, 2023-07-31 Linear motion is richly present in various industries from direct electric propulsion in urban and interurban people movers on wheels or on magnetic cushions MAGLEVs to indoor transport of goods conveyors etc through plunger solenoids to open hotel doors and as electromagnetic power switches to compressor drives by linear oscillatory permanent magnet PM motors smart phones integrated microphone and loudspeakers and controlled vehicles suspension etc Besides the traditional rotary motor drives with mechanical transmissions which mean friction limitations weather dependent in traction heavy vehicles more losses positioning errors backlash in the process and higher maintenance costs to handle them linear motion in industry by direct electromagnetic forces is free of friction limitations for traction free of mechanical transmission and thus more efficient with less maintenance cost and fewer positioning errors backlash This explains why they are used in so many

applications already since the dramatic advancement of power electronics and digital control in the last four decades Modeling performance design control and testing of linear electric machines LEMs show notable differences with respect to rotary electric motor drives which warrant a dedicated treatment of these aspects The Second Edition First Edition 2013 concentrates on the above technical aspects of various types of LEMs in close relationship with specific applications via numerical examples of modeling design control and testing with ample representative results from literature industry and some of the author s contributions such as Technical field and circuit modeling of linear induction motors in flat configurations for low and high speeds with and without dynamic end effects and in tubular configurations short travel design control and testing Linear synchronous motor LSM drives in dc excited homopolar reluctance and superconducting excitation configurations for urban and interurban high speed vehicles propulsion and integrated propulsion and levitation in MAGLEVs modeling design and control with full scale numerical examples with emphasis on lower KWh passenger Km at high speeds Flat and tubular linear permanent magnet PM synchronous motors L PMSMs mainly destined to industrial indoor transport for automation at high efficiency in clean rooms Linear flux modulation motors new breed suitable for very low speed applications due to higher thrust density Plunger solenoids in various applications including new valve PM actuators with millisecond response time Linear resonant PM oscillatory motors design control and testing mainly destined to compressors for higher efficiency in compact drives Attraction and repulsive force suspension levitation systems for MAGLEVs Active and passive guideway MAGLEVs in urban and superhigh speed interurban transport at lower Kwh per passenger km in lighter vehicles without wheels The numerous numerical design and control examples with practical specifications throughout the 23 chapters of the book allow the reader deep and fast access to a practical but thorough unitary good for comparisons methodology in designing and controlling LEMs for various applications

Electrical Machine Drives Control Juha Pyrhonen,Valeria Hrabovcova,R. Scott Semken,2016-10-03 This comprehensive text examines existing and emerging electrical drive technologies The authors clearly define the most basic electrical drive concepts and go on to explain the most important details while maintaining a solid connection to the theory and design of the associated electrical machines Also including links to a number of industrial applications the authors take their investigation of electrical drives beyond theory to examine a number of practical aspects of electrical drive control and application Key features Provides a comprehensive summary of all aspects of controlled speed electrical drive technology including control and operation Handling of electrical drives is solidly linked to the theory and design of the associated electrical machines Added insight into problems and functions are illustrated with clearly understandable figures Offers an understanding of the main phenomena associated with electrical machine drives Considers the problem of bearing currents and voltage stresses of an electrical drive Includes up to date theory and design guidelines taking into account the most recent advances This book s rigorous coverage of theoretical principles and techniques makes for an excellent introduction to controlled speed electrical

drive technologies for Electrical Engineering MSc or PhD students studying electrical drives It also serves as an excellent reference for practicing electrical engineers looking to carry out design analyses and development of controlled speed electrical drives *International Conference on Electrical Machines and Drives* ,1993 **Electric Drives** Ion Boldea,Syed A. Nasar,2005-08-22 Electric drives are everywhere and with the looming promise of electric vehicles and renewable energy they will become more complex and the demands on their capabilities will continue to increase To keep up with these trends students require hands on knowledge and a keen understanding of the subtleties involved in the operation of modern electr

Variable Speed Generators Ion Boldea,2005-11-09 Surveying the technologies used to satisfy the world s demand for open efficient and clean electricity Variable Speed Generators provides an in depth examination of variable speed generators for both stand alone and grid connected applications Part of The Electric Generators Handbook Two Volume Set this work offers authoritative tightly focused treatment of the topologies steady state and transients modeling performance control design and testing of stand alone and grid connected generators operating at variable speeds Variable Speed Generators thoroughly covers all types of variable speed generators currently in progress in distributed generation and renewable energy applications around the world It delves into the steady state transients control and design of claw pole rotor synchronous induction permanent magnet assisted synchronous and switched reluctance starter alternators for hybrid electric vehicles It also discusses PM synchronous transverse flux PM and flux reversal PM generators for low speed wind and hydro energy conversion as well as linear motion alternators for residential and spacecraft applications Numerous design and control examples illustrate the discussion The promise of renewable sustainable energy rests on our ability to design innovative power systems that are able to harness energy from a variety of sources Variable Speed Generators supplies the tools necessary to design validate and deploy the right power generation technologies to fulfill tomorrow s complex energy needs **IEEE International Electric Machines and Drives Conference Record** ,1997 **Reluctance**

Electric Machines Ion Boldea,Lucian Tutelea,2018-07-20 Electric energy is arguably a key agent for our material prosperity With the notable exception of photovoltaic generators electric generators are exclusively used to produce electric energy from mechanical energy More than 60% of all electric energy is used in electric motors for useful mechanical work in various industries This book presents the modeling performance design and control of reluctance synchronous and flux modulation machines developed for higher efficiency and lower cost It covers one and three phase reluctance synchronous motors in line start applications and various reluctance flux modulation motors in pulse width modulation converter fed variable speed drives FEATURES Presents basic and up to date knowledge about the topologies modeling performance design and control of reluctance synchronous machines Includes information on recently introduced reluctance flux modulation electric machines switched flux flux reversal Vernier transverse flux claw pole magnetic geared dual rotor brushless doubly fed etc Features numerous examples and case studies throughout Provides a comprehensive overview of all reluctance electric machines

Permanent Magnet Reluctance & Self Synchronous Motors Syed A. Nasar, Ion Boldea, L. E. Unnewehr, 1993-03-17

Permanent Magnet Reluctance and Self Synchronous Motors discusses the theory design and control of permanent magnet materials. The book describes permanent magnets and their applications to electric machines as well as their performance characteristics and limitations. It presents the performance and calculations of PM commutator motors and an approach to their design. Permanent magnet synchronous motors finite element calculations design methodologies and rectangular and sinusoidal current control are discussed. It presents reluctance motors their topologies and performance analyses as well as reluctance synchronous motors with very large rotor saliency ratios and their vector control. Numerical examples and data of practical interest are provided throughout the book. The book will be very useful to engineers involved in the design and manufacturing of permanent magnet and reluctance motors and high performance drives as well as electrical engineering students and educators.

Electrical Machines and Drives John Hindmarsh, Alasdair Renfrew, 1996

Recent years have brought substantial developments in electrical drive technology and the third edition of this popular introductory text on the subject has been thoroughly revised and updated to take these changes into account.

Electrical Machines and Drives

Peter Vas, 1992. The operation and simulation of a.c. and d.c. machines and a large number of variable speed drives including some of the most recently introduced modern drives are discussed here and a general theory applicable during their steady state and transient operation is presented. Although the detailed mathematical analysis given relies mainly on space vector theory the relationship to other theories including the matrix theory of generalized machine theory is also emphasized. Many of the equations are given in their state variable or analytical forms so that they can be used directly for computer simulations or for hand calculations. Novel features of this book include descriptions of the exact and simplified performance analysis of a.c. machines and a large number of variable speed drives both large and small signal equations. Magnetic saturation effects are incorporated into the different models of smooth air gap and salient pole machines and extension of the space vector model to the double cage induction machine and the salient pole synchronous machine. It is also demonstrated how all the various machine models used in the matrix model of electrical machines can be obtained without having to use matrix transformations while a systematic approach is given for the a priori deduction of all the transformations used in general machine theory. *Electrical Machines and Drives* can be used without any prior knowledge of space vector or other theories. It is aimed at students, teachers and those researchers in industry and universities who require a deep understanding of the various aspects of the operation and the theories of electrical machines and drives and their simulation. *IEEE Africon*, 2004. *Time Domain Wave-splittings and Inverse Problems* Sailing He, Staffan Ström, Vaughan H. Weston, 1998. MIF awaited. Use short description and contents list meanwhile. Contents list is important to potential readers.

International Conference on Power Electronics, Machines and Drives, 16-18 April 2002 : Venue, University of Bath, UK., 2002. This conference provided a forum for delegates to have the opportunity to discuss, debate and learn about

recent developments and future trends in the areas of electrical machines drives solid state motion control and power conversion It was also an opportunity for users to identify short comings in existing designs and equipment and make equipment manufacturers and installers more aware of their potential markets The conference was the premier UK technical event for Power Electronic Machines and Drive specialists **Non-linear Electromagnetic Systems** Paolo Di Barba,A. Savini,2000 **Seventh International Conference on Electrical Machines and Drives, 11-13 September 1995** ,1995 Over 100 papers cover electric vehicle drives induction machines and drives direct current machines analysis and simulation condition monitoring special machines reluctance machines synchronous machines and generators linear machines brushless direct current permanent magnet excited machines generators for wind power thermal effects an *IEEE Conference Record of [the] Annual Meeting* IEEE Industry and General Applications Group,1967 **1996 IEEE AFRICON, 4th AFRICON Conference in Africa, 25-27 September 1996, Tutorials on 24 September 1996** ,1996

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