Short Introduction To Comsol Multiphysics Kth

This e-book is a compilation of papers presented at the 5th Mechanical Engineering Research Day (MERD'18) - Kampus Teknologi UTeM, Melaka, Malaysia on 03 May 2018.

The book offers a comprehensive report on the design and optimization of a thermochemical heat storage system for use in buildings. It combines theoretical and experimental work, with a special emphasis on model-based methods. It describes the numerical modeling of the heat exchanger, which allows recovery of about two thirds of the waste heat from both solar and thermal energy. The book also provides readers with a snapshot of current research on thermochemical storage systems, and an in-depth review of the most important concepts and methods in thermal management modeling. It represents a valuable resource for students, engineers and researchers interested in thermal energy storage processes, as well as for those dealing with modeling and 3D simulations in the field of energy and process engineering.

This thesis introduces a systematic study on Second Generation (2G) High Temperature Superconductors (HTS), covering a novel design of an advanced medical imaging device using HTS, and an in-depth investigation on the losses of HTS. The text covers the design and simulation of a superconducting Lorentz Force Electrical Impedance Tomography. This is potentially a significant medical device that is more efficient and compact than an MRI, and is capable of detecting early cancer, as well as other pathologies such stroke and internal haemorrhages. It also presents the information regarding the fundamental physics of superconductivity, concentrating on the AC losses in superconducting coils and tapes. Overall, the thesis signifies an important contribution to the investigation of High Temperature Superconductors. This thesis will be beneficial to the development of advanced superconducting applications in healthcare as well as more broadly in electrical and energy systems.

Knowledge-based systems, fully integrated with software, have become essential enablers for both science and commerce. But current software methodologies, tools and techniques are not robust or reliable enough for the demands of a constantly changing and evolving market, and many promising approaches have proved to be no more than case-oriented methods that are not fully automated. This book presents the proceedings of the 17th international conference on New Trends in Intelligent Software Methodology, Tools and Techniques (SoMeT18) held in Granada, Spain, 26-28 September 2018. The SoMeT conferences provide a forum for the exchange of ideas and experience, foster new directions in software development methodologies and related tools and techniques, and focus on exploring innovations, controversies, and the current challenges facing the software engineering community. The 80 selected papers included here are divided into 13 chapters, and cover subjects as diverse as intelligent software systems; medical informatics and bioinformatics; artificial intelligence techniques; social learning software and sentiment analysis; cognitive systems and neural analytics; and security, among other things. Offering a state-of-the-art overview of methodologies, tools and techniques, this book will be of interest to all those whose work involves the development or application of software.

??????????????

Collection of selected, peer reviewed papers from the 2014 International Conference on Materials Science and Computational Engineering (ICMSCE 2014), May 20-21, 2014, Qingdao, China. The 1116 papers are grouped as follows: I. Material Science, Chemical Engineering and Technologies, II. Electric material and Electronic Devices, III. Construction Materials, Architecture Science and Civil Engineering, IV. Industrial, Mechanical and Manufacturing Engineering, V. Power Engineering and Energy Supply, VI. Biological Engineering and Food Science, VII. Medicine and Health Engineering, VIII. Products Design and Simulation, Intelligent and Control Systems, IX. Signal Processing and Computer Aided Modeling and Design, X. Communications and Information Technology Applications, XI. Computational Science Technology, Algorithms, XII. Management, Economics, Business, Logistics and Engineering Management, XIII. Environmental Engineering and Resource Development, XIV. New Technologies in Engineering Education and Teaching

This book gives the reader a brief introduction to the COMSOL Multiphysics software tool. Building COMSOL Multiphysics models in 2D or 3D will help students to consolidate their skills by applying basic theory to the real modelling of tasks that in the recent past would require months of programming and dedicated projects to solve a single problem. The examples illustrated in this book include modelling of heat transfer, the migration of a radioactive species in a channel using the Navier-Stokes equations and a chemical heterogenous reactor. These are problems that tend to be rather abstract until such time as a student applies these fundamental equations in practice. Advanced coupling between phenomena in fields such as electromagnetics with others such as heat transfer and computational fluid flow is made easy in COMSOL Multiphysics. A short introduction to the basics, concepts and techniques will allow the reader to progress rapidly and start developing his/her own models. In the second part of this book, some of the models developed in the first part are used to create model applications that can even run on a mobile phone. About the authors: António de Campos Pereira, PhD. in Physics, is an author and consultant. He is a retired researcher from the Dept. of Physics at Stockholm University. Prof. Isabel Paiva, Ph.D. in Chemical Engeneering, is a researcher at C2TN at IST, the School of Engineering of the University of Lisbon. Marcus Inácio has a B.Sc. in Electrotechnical Engineering and is specialising in the field of Medical Physics at KTH, the Royal Institute of Technology in Stockholm, Sweden. Hugo de Campos Pereira is an environmental engineer from Uppsala University and a Ph.D. student specialising in the sorption of highly fluorinated compounds in soils at the Department of Soil and Environment at SLU, the Swedish University of Agricultural Sciences in Uppsala, Sweden.

Containing papers from the 2nd High Performance Design of Structures and Materials and the Optimum Design of Structures conference, following the success of a number of meetings since 1989, this book will be of interest to those in any engineering field. The use of novel materials and new structural concepts nowadays is not restricted to highly technical areas like aerospace, aeronautical applications or the automotive industry, but affects all engineering fields including those such as civil engineering and architecture. Most high performance structures require the development of a generation of new higher performance sustainable materials, which can more easily resist a range of external stimuli or react in a non-conventional manner. Emphasis is placed on intelligent structures and materials as well as the application of computational methods for their modelling, control and management. Optimisation problems of interest involve those related to size, shape and topology of structures and materials. Optimisation techniques have much to offer to those involved in the design of new industrial products. The development of new algorithms and the appearance of powerful commercial computer codes with easy to use graphical interfaces have created a fertile field for the incorporation of optimisation into the design process in all engineering disciplines. The book addresses the topic of design optimisation with welcomed contributions on numerical methods, different optimisation techniques and new software. Several of the topics covered are: Composite materials and structures; Material characterisation; Experiments and numerical analysis; Transformable structures; Environmentally friendly and sustainable structures; Evolutionary methods in optimisation; Aerospace structures; Biomechanics application and Pneumatic structures.

Selected, peer reviewed papers from the International Conference on Material Science and Engineering (ICMSE 2016), June 24-26, 2016, Guangzhou, China

Organised around problem solving, this book introduces the reader to computational simulation, bridging fundamental theory with real-world applications.

Finite element methods for approximating partial differential equations that arise in science and engineering analysis find widespread application. Numerical analysis tools make the solutions of coupled physics, mechanics, chemistry, and even biology accessible to the novice modeler. Nevertheless, modelers must be aware of the limitations and difficulties in developing numerical models that faithfully represent the system they are modeling. This textbook introduces the intellectual framework for modeling with Comsol Multiphysics, a package which has unique features in representing multiply linked domains with complex geometry, highly coupled and nonlinear equation systems, and arbitrarily complicated boundary, auxiliary, and initial conditions. But with this modeling power comes great opportunities and great perils. Progressively, in the first part of the book the novice modeler develops an understanding of how to build up complicated models piecemeal and test them modularly. The second part of the book introduces advanced analysis techniques. The final part of the book deals with case studies in a broad range of application areas including nonlinear pattern formation, thin film dynamics and heterogeneous catalysis, composite and effective media for heat, mass, conductivity, and dispersion, population balances, tomography, multiphase flow, electrokinetic, microfluidic networks, plasma dynamics, and corrosion chemistry. As a revision of Process Modeling and Simulation with Finite Element Methods, this book uses the very latest features of Comsol Multiphysics. There are new case studies on multiphase flow with phase change, plasma dynamics, electromagnetohydrodynamics, microfluidic mixing, and corrosion. In addition, major improvements to the level set method for multiphase flow to ensure phase conservation is introduced. More information about COMSOL can be found here.

This book (vol. 3) presents the proceedings of the IUPESM World Congress on Biomedical Engineering and Medical Physics, a triennially organized joint meeting of medical physicists, biomedical engineers and adjoining health care professionals. Besides the purely scientific and technological topics, the 2018 Congress will also focus on other aspects of professional involvement in health care, such as education and training, accreditation and certification, health technology assessment and patient safety. The IUPESM meeting is an important forum for medical physicists and biomedical engineers in medicine and healthcare learn and share knowledge, and discuss the latest research outcomes and technological advancements as well as new ideas in both medical physics and biomedical engineering field.

This book introduces parabolic wave equations, their key methods of numerical solution, and applications in seismology and ocean acoustics. The parabolic equation method provides an appealing combination of accuracy and efficiency for many nonseparable wave propagation problems in geophysics. While the parabolic equation method was pioneered in the 1940s by Leontovich and Fock who applied it to radio wave propagation in the atmosphere, it thrived in the 1970s due to its usefulness in seismology and ocean acoustics. The book covers progress made following the parabolic equation’s ascendancy in geophysics. It begins with the necessary preliminaries on the elliptic wave equation and its analysis from which the parabolic wave equation is derived and introduced. Subsequently, the authors demonstrate the use of rational approximation techniques, the Padé solution in particular, to find numerical solutions to the energy-conserving parabolic equation, three-dimensional parabolic equations, and horizontal wave equations. The rest of the book demonstrates applications to seismology, ocean acoustics, and beyond, with coverage of elastic waves, sloping interfaces and boundaries, acousto-gravity waves, and waves in poro-elastic media. Overall, it will be of use to students and researchers in wave propagation, ocean acoustics, geophysical sciences and more.

This book presents best selected papers presented at the 4th International Conference on Smart Computing and Informatics (SCI 2020), held at the Department of Computer Science and Engineering, Vasavi College of Engineering (Autonomous), Hyderabad, Telangana, India. It presents advanced and multi-disciplinary research towards the design of smart computing and informatics. The theme is on a broader front which focuses on various innovation paradigms in system knowledge, intelligence and sustainability that may be applied to provide realistic solutions to varied problems in society, environment and industries. The scope is also extended towards the deployment of emerging computational and knowledge transfer approaches, optimizing solutions in various disciplines of science, technology and health care.

Transport of colloidal size particulate matter is of special interest of environmental studies because colloids and adsorbed chemicals can be transported over long distances. Colloid facilitated transport can pose potentially high risk for pollution of ground water. Visualizations of colloid transport using bright field and confocal microscopes have discovered interesting phenomena such colloids moving in circles that cannot be described by the traditional Darcy scale models. That is why computational pore scale models are needed to better understand colloid transport and fate in porous media. Transport and fate of colloids depend largely on flow field in the pores and it is, therefore, important to simulate the flow field while taking grain surface properties into account. The aim of this dissertation is hence to determine the flow fields in realistic pores by solving the incompressible Navier-Stokes equation with a powerful commercial available finite element program COMSOL Multiphysics. The dissertation has five chapters. In the first chapter a short introduction is given. In the second chapter the COMSOL Multiphysics program is tested by revisiting the classical colloid filtration theory on colloid retention on a spherical sand grain. Retention of colloids on grains simulated with COMSOL is found to be similar to semi-analytical solutions previously published. Subsequently colloid retention on an air bubble is simulated and greater colloid retention is calculated than on a soil grain due to the slip boundary condition at the Air-Water interface which creates higher velocities and more fluid flow around air bubble resulting in greater amounts of colloids that can diffuse to the interface. In the third chapter the effect of surface roughness on hydrodynamics of colloid transport in a saturated porous media is investigated by simulating the flow fields around perfectly smooth, smoothed, and naturally rough sand grains. The results show that micron scale surface asperities of rough grains create greater vorticity and more stagnant flow regions compared to smooth grains likely resulting in greater colloid retention for the rough grains. In the fourth chapter the dependence of dynamic contact angle between the interface of two immiscible fluids and solid surface on the interface velocity is simulated in an empty capillary channel to provide a new understanding on the formation of unstable wetting fronts in coarse or water repellent soils. The results show an increase in contact angle when the velocity of the front increases, which is consistent with experimental studies in the literature. In the fifth chapter the problems encountered during the research and future directions are briefly explained.

This issue of ECS Transactions contains papers from the Twelfth International Symposium on Solid Oxide Fuel Cells (SOFC-XII),a continuing biennial series of symposia. The papers deal with materials for cell components and fabrication methods for components and complete cells. Also contained are papers on cell electrochemical performance and its modelling, stacks and systems, and prototype testing of SOFC demonstration units for different applications.

"For decades, various radiation-detecting materials have been extensively researched, to find a better material or mechanism. Recently, there has been a growing need for smaller, and more effective materials or devices that are Integrated Circuits (IC) compatible, and can perform similar functions as bulkier Geiger counters, and other measurement options, which fail the requirement for easy, cheap, and accurate radiation dose measurements. Here arises the use of thin films of chalcogenide glasses, which have unique properties of high thermal stability along with high sensitivity towards short wavelength radiation. In this work, the effect of [gamma]-rays, generated from a 60Co source, on the properties of thin films chalcogenide glasses was studied. Various film compositions from different germanium containing chalcogenide glass systems, i.e., Ge-S, Ge-Se, and Ge-Te, were investigated. These materials are the most thermally stable among the chalcogenide glasses, therefore they were studied to get a broad perspective of the development of structures, and the effect of chemical bonding under different radiation doses. Study of the bare films provided an insight into the structural changes, and allowed the creation of different device designs, which take advantage of these changes. The bare film investigations were performed using Raman spectroscopy, and Energy Dispersive X-ray Spectroscopy (EDS). The result of these studies revealed that the destruction, and reorganization of the structure that occurred depends on the original structure of the host material. Gamma radiation-induced new structural formation were discovered, and related to the film structural organization, and the chemical bonding within the specific films. Additionally, X-ray Photoelectron spectroscopy (XPS), and Atomic Force Microscopy (AFM) provided insight into the topological transformation associated with the underlying structural changes. Along with the bare films, radiation-induced silver diffusion was studied to understand the role, and effect of silver during a radiation event. The introduction of silver creates different silver containing products that aid or hinder the increase in the film conductivity. These silver containing films were investigated using X-ray diffraction, and elemental mapping to determine the silver containing products, crystal sizes, rate of silver diffusion, and the oxidation rate due to radiation dose. These results were discussed based on the particular structures of the glasses, and the existing models. This information was also used as inputs in order to model, and simulate the real time diffusion of silver using COMSOL multiphysics software. Combined, these results provided a partial view of the mechanisms contributing to the device performance. After careful considerations of the various effects on the conductivity of the films, several device designs were fabricated, and their electrical performances are presented as a function of radiation dose. Three distinct generations of devices were created, each of which has offered a different methodology for amplifying the effects determined in the film analysis. Two generations of devices (Gen. 1 and Gen. 2) were fabricated using a laterally diffusing silver source while Gen. 3 devices were created with a specific structure where the vertical diffusion of silver contributed to changes in conductivity. The structure of the Gen. 2 devices was derived through electric field simulations, and then was fabricated using conventional photolithography processes. The conductivity of the three types of devices was measured by performing current vs. voltage measurements after discrete doses, after all the dynamic effects had ceased. Some devices show greater than four orders of magnitude change in current from pre radiation to post irradiation. This is a substantial change, which can be detected using significantly lower voltages when compared to the current dosimeters, allowing these sensors to be used in low power or energy saving applications. Additionally, a special circuit has been designed, which allows the capability to detect these changes in current."--Boise State University ScholarWorks.

Uses mathematical, numerical, and programming tools to solve differential equations for physical phenomena and engineering problems Introduction to Computation and Modeling for Differential Equations, Second Edition features the essential principles and applications of problem solving across disciplines such as engineering, physics, and chemistry. The Second Edition integrates the science of solving differential equations with mathematical, numerical, and programming tools, specifically with methods involving ordinary differential equations; numerical methods for initial value problems (IVPs); numerical methods for boundary value problems (BVPs); partial differential equations (PDEs); numerical methods for parabolic, elliptic, and hyperbolic PDEs; mathematical modeling with differential equations; numerical solutions; and finite difference and finite element methods. The author features a unique “Five-M” approach: Modeling, Mathematics, Methods, MATLAB®, and Multiphysics, which facilitates a thorough understanding of how models are created and preprocessed mathematically with scaling, classification, and approximation and also demonstrates how a problem is solved numerically using the appropriate mathematical methods. With numerous real-world examples to aid in the visualization of the solutions, Introduction to Computation and Modeling for Differential Equations, Second Edition includes: New sections on topics including variational formulation, the finite element method, examples of discretization, ansatz methods such as Galerkin’s method for BVPs, parabolic and elliptic PDEs, and finite volume methods Numerous practical examples with applications in mechanics, fluid dynamics, solid mechanics, chemical engineering, heat conduction, electromagnetic field theory, and control theory, some of which are solved with computer programs MATLAB and COMSOL Multiphysics® Additional exercises that introduce new methods, projects, and problems to further illustrate possible applications A related website with select solutions to the exercises, as well as the MATLAB data sets for ordinary differential equations (ODEs) and PDEs Introduction to Computation and Modeling for Differential Equations, Second Edition is a useful textbook for upper-undergraduate and graduate-level courses in scientific computing, differential equations, ordinary differential equations, partial differential equations, and numerical methods. The book is also an excellent self-study guide for mathematics, science, computer science, physics, and engineering students, as well as an excellent reference for practitioners and consultants who use differential equations and numerical methods in everyday situations.

A comprehensive review of analytical signal processing techniques applied to power systems and power quality applications. This reference book is unique in addressing time-varying waveform and harmonic distortions. It details many different approaches, pooling cutting edge material from university lecturers and practising power engineers to provide a wide spectrum of expertise. Divided into clear sections, the book discusses a range of topics including... current and voltage variations; standards and measurement issues; advanced techniques such as spectral, time-frequency, probabilistic; and further methods, such as independent component analysis, and fuzzy logic. Case studies, real world data and examples (including basic application examples and sample waves from industrial sites) supplement the theory and demonstrate the methods shown. With extensive appendices in addition, this book is of great value to power systems, utility, maintenance and instrumentation engineers. It is also a useful source of information for researchers and consultants, university professors and graduate students in power systems and power quality areas.

The book presents the best articles presented by researchers, academicians and industrial experts in the International Conference on “Innovative Design and Development Practices in Aerospace and Automotive Engineering (I-DAD 2016)”. The book discusses new concept designs, analysis and manufacturing technologies, where more swing is for improved performance through specific and/or multifunctional linguistic design aspects to downsize the system, improve weight to strength ratio, fuel efficiency, better operational capability at room and elevated temperatures, reduced wear and tear, NVH aspects while balancing the challenges of beyond Euro IV/Barat Stage IV emission norms, Greenhouse effects and recyclable materials. The innovative methods discussed in the book will serve as a reference material for educational and research organizations, as well as industry, to take up challenging projects of mutual interest.

Technological advancements continue to enhance the field of engineering and have led to progress in branches that include electrical and mechanical engineering. These technologies have allowed for more sophisticated circuits and components while also advancing renewable energy initiatives. With increased growth in these fields, there is a need for a collection of research that details the variety of works being studied in our globalized world. The Handbook of Research on Recent Developments in Electrical and Mechanical Engineering is a pivotal reference source that discusses the latest advancements in these engineering fields. Featuring research on topics such as materials manufacturing, microwave photons, and wireless power transfer, this book is ideally designed for graduate students, researchers, engineers, manufacturing managers, and academicians seeking coverage on the works and experiences achieved in electrical and mechanical engineering.

Many problems in mechanics involve deformable domains with moving boundaries, including fluid-structure interaction, multiphase flows, flows over soft tissues and textiles, or flows involving accretion/erosion to name but a few. The presence of a moving boundary presents considerable challenges when it comes to modelling and understanding the underlying system dynamics. This proceedings volume collects contributions made at the IUTAM Symposium on Recent Advances in Moving Boundary Problems in Mechanics held in Christchurch, New Zealand in February 2018.

This book is a collection of recent publications from researchers all over the globe in the broad area of high-voltage engineering. The presented research papers cover both experimental and simulation studies, with a focus on topics related to insulation monitoring using state-of-the-art sensors and advanced machine learning algorithms. Special attention was given in the Special Issue to partial discharge monitoring as one of the most important techniques in insulation condition assessment. Moreover, this Special Issue contains several articles which focus on different modeling techniques that help researchers to better evaluate the condition of insulation systems. Different power system assets are addressed in this book, including transformers, outdoor insulators, underground cables, and gas-insulated substations.

Material and contact characterisation is a rapidly advancing field that requires the application of a combination of numerical and experimental methods. Including papers from the International Conference on Computational Methods and Experiments in Material and Contact Characterisation this volume presents the latest research in the field.

The electrical demands in several countries around the world are increasing due to the huge energy requirements of prosperous economies and the human activities of modern life. In order to economically transfer electrical powers from the generation side to the demand side, these powers need to be transferred at high-voltage levels through suitable transmission systems and power substations. To this end, high-voltage transmission systems and power substations are in demand. Actually, they are at the heart of interconnected power systems, in which any faults might lead to unsuitable consequences, abnormal operation situations, security issues, and even power cuts and blackouts. In order to cope with the ever-increasing operation and control complexity and security in interconnected high-voltage power systems, new architectures, concepts, algorithms, and procedures are essential. This book aims to encourage researchers to address the technical issues and research gaps in high-voltage transmission systems and power substations in modern energy systems.

Recent developments in microfluidics have demonstrated enormous potential of microscale cell culture for biology studies and recognized as instrumental in performing rapid and efficient experiments on small-sample volumes. Microfluidic-based cell culture is an area of research that keeps growing and gaining importance as a prominent technology, able to link scientific disciplines with industrial and clinical applications. In particular, organotypic cell culture and its integration in microfluidic devices would enable the realization of “in vivo-like” cell microenvironment within systems that are more amenable to automation and integration. Such remarkable advancement forms the foundation and motivation to transfer research from the laboratory to the field. Although the microfluidics and cell culture technologies have influenced many areas of science, significant research efforts are currently focus on finding methods to transform drug screening and toxicity testing from a system reliant on high-dose animal studies to one based primarily on human-relevant in vitro models. In line with regulatory developments precluding the use of animal testing, as well as fundamental differences in animal versus human, human in vitro methodologies are required to replace the animal-based testes while permitting physiologically relevant model equivalents for superior prediction. Organs-on-a-chip is an ambitious and rapidly growing technology that promise to bridge the gap between in vivo and in vitro studies and open wide possibilities in medical and industrial applications. However, many challenges are still ahead. This eBook present recent state-of-the-art works and critical reviews in organs-on-a-chip technology which highlight the new advances in this growing field with an emphasis on the interface between technological advancements and high impact applications.

Collection of Selected, Peer Reviewed Papers from the 2014 International Conference on Frontiers of Energy, Materials and Information Engineering (ICFMEI 2014), August 21-22, 2014, Hong Kong. The 411 papers are grouped as follows: Chapter 1: Materials and Chemical Engineering and Technologies, Chapter 2: Power, Energy and Thermal Engineering, Environmental and Safety Engineering, Chapter 3:

Civil and Building Engineering, Structural and Geotechnical Engineering, Applied Mechanics, Chapter 4: Mechatronics, Measurement and Detection, Control and Automation, Mechanics Applications, Chapter 5: Computer, Communication, Information, Algorithms and Numerical Methods of Data Processing Engineering, Chapter 6: Urban and City Development, Traffic and Transportation Engineering, Chapter 7: New Technologies in Education and Sports, Chapter 8: Engineering Management, Production Management, Business and Economics.

4M 2006 - Second International Conference on Multi-Material Micro Manufacture covers the latest state-of-the-art research results from leading European researchers in advanced micro technologies for batch processing of metals, polymers, and ceramics, and the development of new production platforms for micro systems-based products. These contributions are from leading authors at a platform endorsed and funded by the European Union R&D community, as well as leading universities, and independent research and corporate organizations. Contains authoritative papers that reflect the latest developments in micro technologies and micro systems-based products

??????????????????????,??

This book features research work presented at the 2nd International Conference on Data Engineering and Communication Technology (ICDECT) held on December 15–16, 2017 at Symbiosis International University, Pune, Maharashtra, India. It discusses advanced, multi-disciplinary research into smart computing, information systems and electronic systems, focusing on innovation paradigms in system knowledge, intelligence and sustainability that can be applied to provide feasible solutions to varied problems in society, the environment and industry. It also addresses the deployment of emerging computational and knowledge transfer approaches, optimizing solutions in a variety of disciplines of computer science and electronics engineering.

This conference book contains the abstracts and papers presented by simulation experts at the Iberian COMSOL Multiphysics Conference 2014, held in Málaga (Spain), on May 29th of 2014. This material explore innovative research and products designed by your peers using COMSOL Multiphysics. Research topics span a wide array of industries and application areas, including the electrical, mechanical, fluid, and chemical disciplines. https://www.addlink.es/icmc-2014

The editors of this Special Issue titled “Intelligent Control in Energy Systems” have attempted to create a book containing original technical articles addressing various elements of intelligent control in energy systems. In response to our call for papers, we received 60 submissions. Of those submissions, 27 were published and 33 were rejected. In this book, we offer the 27 accepted technical articles as well as one editorial. Authors from 15 countries (China, Netherlands, Spain, Tunisia, United Sates of America, Korea, Brazil, Egypt, Denmark, Indonesia, Oman, Canada, Algeria, Mexico, and the Czech Republic) elaborate on several aspects of intelligent control in energy systems. The book covers a broad range of topics including fuzzy PID in automotive fuel cell and MPPT tracking, neural networks for fuel cell control and dynamic optimization of energy management, adaptive control on power systems, hierarchical Petri Nets in microgrid management, model predictive control for electric vehicle battery and frequency regulation in HVAC systems, deep learning for power consumption forecasting, decision trees for wind systems, risk analysis for demand side management, finite state automata for HVAC control, robust ?-synthesis for microgrids, and neuro-fuzzy systems in energy storage.