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Modular Systems for Energy and Fuel Recovery and Conversion - Yatish T. Shah 2019-06-28
Modular Systems for Energy and Fuel Recovery and Conversion surveys the benefits of the modular approach in the front end of the energy industry. The book also outlines strategies for

managing modular approaches for fossil, renewable, and nuclear energy resource recovery and conversion with the help of successful industrial examples. The book points out that while the modular approach is most applicable for distributed and small-scale energy

systems, it is also often used for parts of large-scale centralized systems. With the help of successful industrial examples of modular approaches for energy and fuel recovery and conversion, the book points out the need for more balance between large-scale centralized systems and small-scale distributed systems to serve the energy needs of rural and isolated communities. Coal, oil, natural gas, hydrogen, biomass, waste, nuclear, geothermal solar, wind, and hydro energy are examined, showing that modular operations are very successfully used in all these components of the energy industry. Aimed at academic researchers and industry professionals, this book provides successful examples and analysis of the modular operation for energy and fuel recovery and conversion. It is also a reference for those who are engaged in the development of modular systems for energy and fuel recovery and conversion.

Two-Phase Flow Heat Exchangers - Sadik Kakaç
2012-12-06

Two-phase flow heat exchangers are vital components of systems for power generation, chemical processing, and thermal environment control. The art and science of the design of such heat exchangers have advanced considerably in recent years. This is due to better understanding of the fundamentals of two-phase flow and heat transfer in simple geometries, greater appreciation of these processes in complex geometries, and enhanced predictive capability through use of complex computer codes. The subject is clearly of great fundamental and practical importance. The NATO ASI on Thermal-Hydraulic Fundamentals and Design of Two-Phase Flow Heat Exchangers was held in Povoá de Varzim (near Porto), Portugal, July 6-17, 1987. Participating in the organization of the ASI were the Department of Mechanical Engineering and the Clean Energy Research Institute, University of Miami; Universidade do Porto; and the Department of Mechanical Engineering, Aeronautical Engineer

ing, and Mechanics, Rensselaer Polytechnic Institute. The ASI was arranged primarily as a high-level teaching activity by experts representing both academic and industrial viewpoints. The program included the presentation of invited lectures, a limited number of related technical papers and discussion sessions.

Optimization in the Energy Industry - Josef Kallrath 2008-12-25

This book offers a broad, in-depth overview that reflects the requirements, possibilities and limits of mathematical optimization and, especially, stochastic optimization in the energy industry.

Structural Optimization and Experimental Investigation of the Organic Rankine Cycle for Solar Thermal Power Generation - Jing Li 2014-12-09

Compared to the conventional Rankine cycle using water, the ORC can create efficient expansion at low power, avoid superheater and offer higher thermal efficiency in low

temperature application. Small-scale ORCs from several kWe to a few hundred kWe offer great potential for meeting the residential demand on heat and power, and are of growing interest in scientific and technical fields. However, one critical problem is the decreased device efficiency and cost-effectiveness that arises when the ORC is scaled down. In this thesis, the ORC is combined with low concentration-ratio solar collectors. The background, research trend, merits and importance of the solar ORC are described. To reduce the thermodynamic irreversibility and the cost of the system, three innovative solutions are proposed: solar ORC without heat transfer fluid (HTF), which employs two-stage collectors and heat storage units; hybrid solar power generation based on ORC and amorphous silicon cells; osmosis-driven solar ORC. Heat collection, storage and power conversion are optimized. The design, construction and test of a prototype are conducted, demonstrating the feasibility of the

ORC for small-scale cogeneration. Special attention is paid to the variable operation and parameter design with respect to the condensation temperature.

Computational and Experimental Simulations in Engineering - Satya N. Atluri 2020-12-14

This book gathers the latest advances, innovations, and applications in the field of computational engineering, as presented by leading international researchers and engineers at the 26th International Conference on Computational & Experimental Engineering and Sciences (ICCES), held in Phuket, Thailand on January 6-10, 2021. ICCES covers all aspects of applied sciences and engineering: theoretical, analytical, computational, and experimental studies and solutions of problems in the physical, chemical, biological, mechanical, electrical, and mathematical sciences. As such, the book discusses highly diverse topics, including composites; bioengineering & biomechanics; geotechnical engineering;

offshore & arctic engineering; multi-scale & multi-physics fluid engineering; structural integrity & longevity; materials design & simulation; and computer modeling methods in engineering. The contributions, which were selected by means of a rigorous international peer-review process, highlight numerous exciting ideas that will spur novel research directions and foster multidisciplinary collaborations.

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Advances in Geometric Programming - Mordecai Avriel 2013-03-09

In 1961, C. Zener, then Director of Science at Westinghouse Corporation, and a member of the U. S. National Academy of Sciences who has made important contributions to physics and engineering, published a short article in the Proceedings of the National Academy of Sciences entitled "A Mathematical Aid in Optimizing Engineering Design." In this article

Zener considered the problem of finding an optimal engineering design that can often be expressed as the problem of minimizing a numerical cost function, termed a "generalized polynomial," consisting of a sum of terms, where each term is a product of a positive constant and the design variables, raised to arbitrary powers. He observed that if the number of terms exceeds the number of variables by one, the optimal values of the design variables can be easily found by solving a set of linear equations. Furthermore, certain invariances of the relative contribution of each term to the total cost can be deduced. The mathematical intricacies in Zener's method soon raised the curiosity of R. J. Duffin, the distinguished mathematician from Carnegie Mellon University who joined forces with Zener in laying the rigorous mathematical foundations of optimizing generalized polynomials. Interestingly, the investigation of optimality conditions and properties of the optimal solutions in such problems were carried

out by Duffin and Zener with the aid of inequalities, rather than the more common approach of the Kuhn-Tucker theory.

Applied Data Analysis and Modeling for Energy Engineers and Scientists - T. Agami Reddy 2011-08-09

Applied Data Analysis and Modeling for Energy Engineers and Scientists fills an identified gap in engineering and science education and practice for both students and practitioners. It demonstrates how to apply concepts and methods learned in disparate courses such as mathematical modeling, probability, statistics, experimental design, regression, model building, optimization, risk analysis and decision-making to actual engineering processes and systems. The text provides a formal structure that offers a basic, broad and unified perspective, while imparting the knowledge, skills and confidence to work in data analysis and modeling. This volume uses numerous solved examples, published case studies from the author's own

research, and well-conceived problems in order to enhance comprehension levels among readers and their understanding of the “processes” along with the tools.

Emerging Research in Data Engineering Systems and Computer Communications - P. Venkata Krishna 2020-02-10

This book gathers selected papers presented at the 2nd International Conference on Computing, Communications and Data Engineering, held at Sri Padmavati Mahila Visvavidyalayam, Tirupati, India from 1 to 2 Feb 2019. Chiefly discussing major issues and challenges in data engineering systems and computer communications, the topics covered include wireless systems and IoT, machine learning, optimization, control, statistics, and social computing.

Advances in Green Energies and Materials Technology - Younes Chiba 2021-06-09

This book presents selected articles from the Algerian Symposium on Renewable Energy and Materials (ASREM-2020) held at Médéa, Algeria.

It highlights the latest advances in the field of green energies and material technology with specific accentuation on numerical plans and recent methodologies designed to solve engineering problems. It includes mathematical models and experimental measurements to study different problems in renewable energy and materials characterization, with contributions from experts in both academia and industry, and presents a platform to further collaborations in this important area.

Sequential Approximate Multiobjective Optimization Using Computational Intelligence - Hirotaka Nakayama 2009-06-12

Many kinds of practical problems such as engineering design, industrial management and financial investment have multiple objectives conflicting with each other.

Those problems can be formulated as multiobjective optimization. In multiobjective optimization, there does not necessarily a unique solution which minimizes (or maximizes) all objective

functions. We usually face to the situation in which if we want to improve some of objectives, we have to give up other objectives. Finally, we pay much attention on how much to improve some of objectives and instead how much to give up others. This is called "trade-off." Note that making trade-off is a problem of value judgment of decision makers. One of main themes of multiobjective optimization is how to incorporate value judgment of decision makers into decision support systems. There are two major issues in value judgment (1) multiplicity of value judgment and (2) dynamics of value judgment. The multiplicity of value judgment is treated as trade-off analysis in multiobjective optimization. On the other hand, dynamics of value judgment is difficult to treat. However, it is natural that decision makers change their value judgment even in decision making process, because they obtain new information during the process. Therefore, decision support systems are to be robust against the change of value judgment of

decision makers. To this aim, interactive programming methods which search a solution while eliciting partial information on value judgment of decision makers have been developed. Those methods are required to perform flexibly for decision makers' attitude.

A Hybrid Approach for Power Plant Fault Diagnostics - Tamiru Alemu Lemma 2017-12-30

This book provides a hybrid approach to fault detection and diagnostics. It presents a detailed analysis related to practical applications of the fault detection and diagnostics framework, and highlights recent findings on power plant nonlinear model identification and fault diagnostics. The effectiveness of the methods presented is tested using data acquired from actual cogeneration and cooling plants (CCPs). The models presented were developed by applying Neuro-Fuzzy (NF) methods. The book offers a valuable resource for researchers and practicing engineers alike.

Modular High-temperature Gas-cooled

Reactor Power Plant - Kurt Kugeler

2018-10-05

"Modular High-temperature Gas-cooled Reactor Power Plant" introduces the power plants driven by modular high temperature gas-cooled reactors (HTR), which are characterized by their inherent safety features and high output temperatures. HTRs have the potential to be adopted near demand side to supply both electricity and process heat, directly replacing conventional fossil fuels. The world is confronted with two dilemmas in the energy sector, namely climate change and energy supply security. HTRs have the potential to significantly alleviate these concerns. This book will provide readers with a thorough understanding of HTRs, their history, principles, and fields of application. The book is intended for researchers and engineers involved with nuclear engineering and energy technology.

Advanced Energy Systems, Second Edition -

Nikolai V. Khartchenko 2013-12-20

This second edition to a popular first provides a comprehensive, fully updated treatment of advanced conventional power generation and cogeneration plants, as well as alternative energy technologies. Organized into two parts: Conventional Power Generation Technology and Renewable and Emerging Clean Energy Systems, the book covers the fundamentals, analysis, design, and practical aspects of advanced energy systems, thus supplying a strong theoretical background for highly efficient energy conversion. New and enhanced topics include: Large-scale solar thermal electric and photovoltaic (PV) plants Advanced supercritical and ultra-supercritical steam power generation technologies Advanced coal- and gas-fired power plants (PP) with high conversion efficiency and low environmental impact Hybrid/integrated (i.e., fossil fuel + REN) power generation technologies, such as integrated solar combined-cycle (ISCC) Clean energy technologies, including "clean coal," H2 and fuel

cell, plus integrated power and cogeneration plants (i.e., conventional PP + fuel cell stacks) Emerging trends, including magnetohydrodynamic (MHD)-generator and controlled thermonuclear fusion reactor technologies with low/zero CO₂ emissions Large capacity offshore and on-land wind farms, as well as other renewable (REN) power generation technologies using hydro, geothermal, ocean, and bio energy systems Containing over 50 solved examples, plus problem sets, full figures, appendices, references, and property data, this practical guide to modern energy technologies serves energy engineering students and professionals alike in design calculations of energy systems.

Thermodynamics and Energy Conversion - Henning Struchtrup 2014-07-02

This textbook gives a thorough treatment of engineering thermodynamics with applications to classical and modern energy conversion devices. Some emphasis lies on the description

of irreversible processes, such as friction, heat transfer and mixing and the evaluation of the related work losses. Better use of resources requires high efficiencies therefore the reduction of irreversible losses should be seen as one of the main goals of a thermal engineer. This book provides the necessary tools. Topics include: car and aircraft engines, including Otto, Diesel and Atkinson cycles, by-pass turbofan engines, ramjet and scramjet; steam and gas power plants, including advanced regenerative systems, solar tower and compressed air energy storage; mixing and separation, including reverse osmosis, osmotic power plants and carbon sequestration; phase equilibrium and chemical equilibrium, distillation, chemical reactors, combustion processes and fuel cells; the microscopic definition of entropy. The book includes about 300 end-of-chapter problems for homework assignments and exams. The material presented suffices for two or three full-term courses on thermodynamics and energy

conversion.

Power Plant Engineering - Larry Drbal

2012-12-06

This comprehensive volume provides a complete, authoritative, up-to-date reference for all aspects of power plant engineering. Coverage ranges from engineering economics to coal and limestone handling, from design processes to plant thermal heat balances. Both theory and practical applications are covered, giving engineers the information needed to plan, design, construct, upgrade, and operate power plants. Power Plant Engineering is the culmination of experience of hundreds of engineers from Black & Veatch, a leading firm in the field for more than 80 years. The authors review all major power generating technologies, giving particular emphasis to current approaches. Special features of the book include: * More than 1000 figures and lines drawings that illustrate all aspects of the subject. * Coverage of related components and

systems in power plants such as turbine-generators, feedwater heaters, condenser, and cooling towers. * Definitions and analyses of the features of various plant systems. * Discussions of promising future technologies. Power Plant Engineering will be the standard reference in the professional engineer's library as the source of information on steam power plant generation. In addition, the clear presentation of the material will make this book suitable for use by students preparing to enter the field.

Proceedings of the International Symposium on Sustainable Energy and Power Engineering 2021

- Akhmetova Irina

This book comprises the proceedings of the International Symposium on Sustainable Energy and Power Engineering (SUSE) 2021. The contents of this volume focus on recent technological advances in the field of energy efficiency and green buildings, new construction materials and related technology, hydrogen and renewable energy, environmental aspects of the

modern power industry, etc. The contents cover latest advances especially in digital transformation of society and economy of the energy sector, turbomachines and combined plants, intelligent energy systems. This volume will prove a valuable resource for those in academia and industry. .

Proceedings of The 20th Pacific Basin

Nuclear Conference - Hong Jiang 2017-01-10

This is the first in a series of three proceedings of the 20th Pacific Basin Nuclear Conference (PBNC). This volume covers the topics of Safety and Security, Public Acceptance and Nuclear Education, as well as Economics and Reducing Cost. As one in the most important and influential conference series of nuclear science and technology, the 20th PBNC was held in Beijing and the theme of this meeting was "Nuclear: Powering the Development of the Pacific Basin and the World". It brought together outstanding nuclear scientist and technical experts, senior industry executives, senior

government officials and international energy organization leaders from all across the world. The book is not only a good summary of the new developments in the field, but also a useful guideline for the researchers, engineers and graduate students.

Geothermal Power Plants - Ronald DiPippo
2011-04-08

Ron DiPippo, Professor Emeritus at the University of Massachusetts Dartmouth, is a world-regarded geothermal expert. This single resource covers all aspects of the utilization of geothermal energy for power generation from fundamental scientific and engineering principles. The thermodynamic basis for the design of geothermal power plants is at the heart of the book and readers are clearly guided on the process of designing and analysing the key types of geothermal energy conversion systems. Its practical emphasis is enhanced by the use of case studies from real plants that increase the reader's understanding of

geothermal energy conversion and provide a unique compilation of hard-to-obtain data and experience. An important new chapter covers Environmental Impact and Abatement Technologies, including gaseous and solid emissions; water, noise and thermal pollutions; land usage; disturbance of natural hydrothermal manifestations, habitats and vegetation; minimisation of CO₂ emissions and environmental impact assessment. The book is illustrated with over 240 photographs and drawings. Nine chapters include practice problems, with solutions, which enable the book to be used as a course text. Also includes a definitive worldwide compilation of every geothermal power plant that has operated, unit by unit, plus a concise primer on the applicable thermodynamics. * Engineering principles are at the heart of the book, with complete coverage of the thermodynamic basis for the design of geothermal power systems * Practical applications are backed up by an extensive

selection of case studies that show how geothermal energy conversion systems have been designed, applied and exploited in practice * World renowned geothermal expert DiPippo has including a new chapter on Environmental Impact and Abatement Technology in this new edition

Introduction to Mechanical Engineering - J. Paulo Davim 2018-04-28

This textbook fosters information exchange and discussion on all aspects of introductory matters of modern mechanical engineering from a number of perspectives including: mechanical engineering as a profession, materials and manufacturing processes, machining and machine tools, tribology and surface engineering, solid mechanics, applied and computational mechanics, mechanical design, mechatronics and robotics, fluid mechanics and heat transfer, renewable energies, biomechanics, nanoengineering and nanomechanics. At the end of each chapter, a

list of 10 questions (and answers) is provided.
Combined Cycle Driven Efficiency for Next Generation Nuclear Power Plants - Bahman Zohuri 2017-12-07

The second edition of this book includes the most up-to-date details on the advantages of Nuclear Air-Brayton Power Plant Cycles for advanced reactors. It demonstrates significant advantages for typical sodium cooled reactors and describes how these advantages will grow as higher temperature systems (molten salts) are developed. It also describes how a Nuclear Air-Brayton system can be integrated with significant renewable (solar and wind) energy systems to build a low carbon grid. Starting with basic principles of thermodynamics as applied to power plant systems, it moves on to describe several types of Nuclear Air-Brayton systems that can be employed to meet different requirements. It provides estimates of component sizes and performance criteria for Small Modular Reactors (SMR). This book has

been revised to include updated tables and significant new results that have become available for intercooled systems in the time since the previous edition published. In this edition also, the steam tables have been updated and Chapters 9 and 10 have been rewritten to keep up with the most up-to-date technology and current research.

Proceedings of the 7th International Conference on Advances in Energy Research - Manaswita Bose 2020-10-17

This book presents selected papers from the 7th International Conference on Advances in Energy Research (ICAER 2019), providing a comprehensive coverage encompassing all fields and aspects of energy in terms of generation, storage, and distribution. Themes such as optimization of energy systems, energy efficiency, economics, management, and policy, and the interlinkages between energy and environment are included. The contents of this book will be of use to researchers and policy

makers alike.

The Role of Exergy in Energy and the Environment - Sandro Nižetić 2018-07-30

This book is devoted to the analysis and applications of energy, exergy, and environmental issues in all sectors of the economy, including industrial processes, transportation, buildings, and services. Energy sources and technologies considered are hydrocarbons, wind and solar energy, fuel cells, as well as thermal and electrical storage. This book provides theoretical insights, along with state-of-the-art case studies and examples and will appeal to the academic community, but also to energy and environmental professionals and decision makers.

Proceedings of the International Conference on Soft Computing for Problem Solving (SocProS 2011) December 20-22, 2011 -

Kusum Deep 2012-04-13

The objective is to provide the latest developments in the area of soft computing.

These are the cutting edge technologies that have immense application in various fields. All the papers will undergo the peer review process to maintain the quality of work.

Thermal Systems - Ivan CK Tam 2021-04-07

We live in interesting times in which life as we know it is being threatened by manmade changes to the atmosphere in which we live. On the global scale, concern is focused on climate change due to greenhouse gas emissions, and on a national scale, atmospheric pollution produced by combustion processes is of concern. A possible approach is through the development of new ideas and innovative processes to the current practices. Among the available options, multi-generation processes such as the trigeneration cycle, battery storage system, solar power plants and heat pumps have been widely studied, as they potentially allow for greater efficiency, lower costs, and reduced emissions. On the other hand, some researchers had been working to increase the potential of

energy generation process through heat recovery under the steam generator, organic Rankine cycle, and absorption chillers. In this Special Issue on "Thermal Systems" of fundamental or applied and numerical or experimental investigation, many new concepts in thermal systems and energy utilization were explored and published as original research papers in this "Special Issue".

Advances in Automation - Andrey A. Radionov
2020-02-18

This book reports on innovative research and developments in automation. The chapters span a wide range of disciplines, including communication engineering, power engineering, control engineering, instrumentation, signal processing and cybersecurity. Emphasis is given to methods and findings aimed at fostering better control and monitoring of industrial and manufacturing processes, and improving safety. Based on the International Russian Automation Conference, held in September 8-14, 2019, in

Sochi, Russia, the book provides academics and professionals with a timely overview and extensive information on the state of the art in the field of automation and control systems, and is expected to foster new ideas, as well as collaboration between different groups in different countries.

Thermodynamic Optimization of Complex Energy Systems - Adrian Bejan 2012-12-06

A comprehensive assessment of the methodologies of thermodynamic optimization, exergy analysis and thermoeconomics, and their application to the design of efficient and environmentally sound energy systems. The chapters are organized in a sequence that begins with pure thermodynamics and progresses towards the blending of thermodynamics with other disciplines, such as heat transfer and cost accounting. Three methods of analysis stand out: entropy generation minimization, exergy (or availability) analysis, and thermoeconomics. The book

reviews current directions in a field that is both extremely important and intellectually alive. Additionally, new directions for research on thermodynamics and optimization are revealed.

Sustainable Design for Renewable Processes

- Mariano Martín 2021-10-31

Sustainable Design for Renewable Processes: Principles and Case Studies covers the basic technologies to collect and process renewable resources and raw materials and transform them into useful products. Starting with basic principles on process analysis, integration and optimization that also addresses challenges, the book then discusses applied principles using a number of examples and case studies that cover biomass, waste, solar, water and wind as resources, along with a set of technologies including gasification, pyrolysis, hydrolysis, digestion, fermentation, solar thermal, solar photovoltaics, electrolysis, energy storage, etc. The book includes examples, exercises and models using Python, Julia, MATLAB, GAMS,

EXCEL, CHEMCAD or ASPEN. This book shows students the challenges posed by renewable-based processes by presenting fundamentals, case studies and step-by-step analyses of renewable resources. Hence, this is an ideal and comprehensive reference for Masters and PhD students, engineers and designers. Addresses the fundamentals and applications of renewable energy process design for all major resources, including biomass, solar, wind, geothermal, waste and water Provides detailed case studies, step-by-step instructions, and guidance for each renewable energy technology Presents models and simulations for a wide variety of platforms, including state-of-the-art and open access platforms in addition to well-known commercial software

EPA Reports Bibliography - United States.
Environmental Protection Agency 1973

The Brown Boveri Review - 1962

Handbook of Applied Thermal Design - Eric C. Guyer 1999-02-01

Gives a foundation to the four principle facets of thermal design: heat transfer analysis, materials performance, heating and cooling technology, and instrumentation and control. The focus is on providing practical thermal design and development guidance across the spectrum of problem analysis, material applications, equipment specification, and sensor and control selection.

Energy, Transportation and Global Warming - Panagiotis Grammelis 2016-06-14

This book presents a holistic view of climate change by examining a number of energy and transportation technologies and their impact on the climate. High-quality technical research results from specific test-cases around the globe are presented, and developments in global warming are discussed, focusing on current emissions policies from air and maritime transport to fossil fuel applications. Novel

technologies such as carbon capture and storage are investigated together with the corresponding process and systems analysis, as well as optimization for mitigating CO2 emissions. Water resources management, waste water treatment, and waste management issues are also covered. Finally, biomass, hydrogen and solar energy applications are presented along with some insights on green buildings. Energy, Transportation and Global Warming is of great interest to researchers in the field of renewable and green energy as well as professionals in climate change management, the transportation sector, and environmental policy.

Optimization for Control, Observation and Safety - Guillermo Valencia-Palomo 2020-04-01

Mathematical optimization is the selection of the best element in a set with respect to a given criterion. Optimization has become one of the most used tools in control theory to compute control laws, adjust parameters (tuning), estimate states, fit model parameters, find

conditions in order to fulfill a given closed-loop property, among others. Optimization also plays an important role in the design of fault detection and isolation systems to prevent safety hazards and production losses that require the detection and identification of faults, as early as possible to minimize their impacts by implementing real-time fault detection and fault-tolerant systems. Recently, it has been proven that many optimization problems with convex objective functions and linear matrix inequality (LMI) constraints can be solved easily and efficiently using existing software, which increases the flexibility and applicability of the control algorithms. Therefore, real-world control systems need to comply with several conditions and constraints that have to be taken into account in the problem formulation, which represents a challenge in the application of the optimization algorithms. This book offers an overview of the state-of-the-art of the most advanced optimization techniques and their

applications in control engineering.

Thermal System Design and Optimization -

C. Balaji 2021-01-29

This highly informative and carefully presented textbook introduces the general principles involved in system design and optimization as applicable to thermal systems, followed by the methods to accomplish them. It introduces contemporary techniques like Genetic Algorithms, Simulated Annealing, and Bayesian Inference in the context of optimization of thermal systems. There is a separate chapter devoted to inverse problems in thermal systems. It also contains sections on Integer Programming and Multi-Objective optimization. The linear programming chapter is fortified by a detailed presentation of the Simplex method. A major highlight of the textbook is the inclusion of workable MATLAB codes for examples of key algorithms discussed in the book. Examples in each chapter clarify the concepts and methods presented and end-of-chapter problems

supplement the material presented and enhance the learning process.

Society 5.0: Human-Centered Society

Challenges and Solutions - Alla G. Kravets

2022-05-04

This book focuses on open issues of Society 5.0, a new paradigm of a society that balances a human-centred approach and technologies based on cyber-physical systems and artificial intelligence. The book contains results of how intelligent or cyber-physical systems help to improve the quality of life in society despite new challenges. Discusses implemented breakthrough systems, models, programs, and methods that cover the following topics: biomedicine and healthcare, innovations in socio-economic systems, intelligent energetics, advances in transport systems, human-centric technologies. These approaches help to improve human society using cyber-physical systems in a dramatically changing environment. The target audience of the book are practitioners,

enterprises representatives, scientists, PhD and Master students who perform scientific research on the application of cyber-physical systems towards Society 5.0.

Thermal System Optimization - Vivek K. Patel

2019-02-14

This book presents a wide-ranging review of the latest research and development directions in thermal systems optimization using population-based metaheuristic methods. It helps readers to identify the best methods for their own systems, providing details of mathematical models and algorithms suitable for implementation. To reduce mathematical complexity, the authors focus on optimization of individual components rather than taking on systems as a whole. They employ numerous case studies: heat exchangers; cooling towers; power generators; refrigeration systems; and others. The importance of these subsystems to real-world situations from internal combustion to air-conditioning is made clear. The thermal systems under discussion are

analysed using various metaheuristic techniques, with comparative results for different systems. The inclusion of detailed MATLAB® codes in the text will assist readers—researchers, practitioners or students—to assess these techniques for different real-world systems. Thermal System Optimization is a useful tool for thermal design researchers and engineers in academia and industry, wishing to perform thermal system identification with properly optimized parameters. It will be of interest for researchers, practitioners and graduate students with backgrounds in mechanical, chemical and power engineering.

Alternative Energy Sources - Efsthios E (Stathis) Michaelides 2012-01-15

Alternative Energy Sources is designed to give the reader, a clear view of the role each form of alternative energy may play in supplying the energy needs of the human society in the near future (20-50 years). The two first chapters on

"energy demand and supply" and "environmental effects," set the tone as to why alternative energy is essential for the future. The third chapter gives the laws of energy conversion processes, as well as the limitations of converting one energy form to another. The section on exergy gives a quantitative background on the capability/potential of each energy source to produce power. The fourth, fifth and sixth chapters are expositions of fission and fusion nuclear energy, the power plants that may produce power from these sources and the issues that will frame the public debate on nuclear energy. The following five chapters include descriptions of the most common renewable energy sources (wind, solar, geothermal, biomass, hydroelectric) some of the less common sources (e.g. tidal and wave energy). The emphasis of these chapters will be on the global potential of each source, the engineering/technical systems that are used in harnessing the potential of each source, the

technological developments that will contribute to wider utilization of the sources and environmental effects associated with their wider use. The last three chapters are: "energy storage," which will become an important issue if renewable energy sources are used widely. The fourteen chapters in the book have been chosen so that one may fit a semester University course around this book. At the end of every chapter, there are 10-20 problems and 1-3 suggestions of semester projects that may be assigned to students for further research.

Application of Compact Heat Exchangers For Combined Cycle Driven Efficiency In Next Generation Nuclear Power Plants - Bahman Zohuri 2015-11-19

Covers the fundamentals of combined-cycle plants to provide background for understanding the progressive design approaches at the heart of the text Discusses the types of compact heat exchanger surfaces, suggesting novel designs that can be considered for optimal cost

effectiveness and maximum energy production Undertakes the thermal analysis of these compact heat exchangers throughout the life cycle, from the design perspective through operational and safety assurance stages This book describes the quest to create novel designs for compact heat exchangers in support of emergent combined cycle nuclear plants. The text opens with a concise explanation of the fundamentals of combined cycles, describing their efficiency impacts on electrical power generation systems. It then covers the implementation of these principles in nuclear reactor power systems, focusing on the role of compact heat exchangers in the combined cycle loop and applying them to the challenges facing actual nuclear power systems. The various types of compact heat exchanger surfaces and designs are given thorough consideration before the author turns his attention to discussing current and projected reactor systems, and how the novel design of these compact heat exchangers

can be applied to innovative designs, operation and safety analyses to optimize thermal efficiency. The book is written at an undergraduate level, but will be useful to practicing engineers and scientists as well.

Sauerstoff - Anthony A. Delyannis 2013-11-11
Processes for recovering fresh water from the oceans - of which men have dreamed since antiquity - have changed markedly in the last 20 years. In fact, it has become possible to increase the productivity of the technical steps involved that the cost of production of such water is almost three orders of magnitude smaller than for other large volume industrial products. However, the monographs and comprehensive reviews which have appeared to date in this field have been prepared by specialists for specialists. In accordance with the tradition and objectives of the Gmelin Handbook, this bibliography has been prepared to provide access to all of the ways in which fresh water can be, and has been, obtained on an industrial

scale from the ocean. Production of fresh water from sea and brackish waters amounts to almost two million cubic meters per day, and this is increasing by about 25% per year. This means that it will increase nearly tenfold in 10 years.

Design Optimization of Renewable Energy Systems Using Advanced Optimization Algorithms - Venkata Rao Ravipudi 2022
This book describes applications of Jaya and Rao algorithms on real case studies concerning different renewable energy sources. In the last few decades, researchers have focused on renewable energy resources like solar energy, bio-energy, wave energy, ocean thermal energy, tidal energy, geothermal energy, and wind energy. This has resulted in the development of new techniques and tools that could harvest energy from renewable energy sources. Many researchers and scientists have focused on developing and optimizing the energy systems to extract and utilize renewable energy more efficiently. In this book, recently developed Jaya

and Rao (Rao-1, Rao-2, and Rao-3) algorithms are introduced for single- and multi-objective optimization of selected renewable energy systems. The results of applications of the different versions of Jaya and Rao algorithms are compared with the other optimization techniques like GA, NSGA-II, PSO, MOPSO, ABC, etc., and the performance of the Jaya and Rao algorithms is highlighted compared to other optimization algorithms in the case of renewable

energy systems. The book also includes the validation of different versions of the Jaya and Rao algorithms through the application to complex single- and multi-objective unconstrained benchmark functions. The algorithms and computer codes of different version of Jaya and Rao algorithms are included in the book that will be very much useful to readers in industry and academic research.