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Organic Rankine Cycle (ORC) Power Systems -
Ennio Macchi 2016-08-24

Organic Rankine Cycle (ORC) Power Systems: Technologies and Applications provides a systematic and detailed description of organic Rankine cycle technologies and the way they are increasingly of interest for cost-effective sustainable energy generation. Popular applications include cogeneration from biomass and electricity generation from geothermal reservoirs and concentrating solar power installations, as well as waste heat recovery from gas turbines, internal combustion engines and medium- and low-temperature industrial processes. With hundreds of ORC power systems already in operation and the market growing at a fast pace, this is an active and engaging area of scientific research and technical development. The book is structured in three main parts: (i) Introduction to ORC Power Systems, Design and Optimization, (ii) ORC Plant Components, and (iii) Fields of Application. Provides a thorough

introduction to ORC power systems Contains detailed chapters on ORC plant components Includes a section focusing on ORC design and optimization Reviews key applications of ORC technologies, including cogeneration from biomass, electricity generation from geothermal reservoirs and concentrating solar power installations, waste heat recovery from gas turbines, internal combustion engines and medium- and low-temperature industrial processes Various chapters are authored by well-known specialists from Academia and ORC manufacturers

Small Modular Reactors - Daniel T Ingersoll
2015-11-20

There is currently significant interest in the development of small modular reactors (SMRs) for the generation of both electricity and process heat. SMRs offer potential benefits in terms of better affordability and enhanced safety, and can also be sited more flexibly than traditional nuclear plants. Small Modular Reactors: Nuclear

Power Fad or Future? reviews SMR features, promises, and problems, also discussing what lies ahead for reactors of this type. The book is organized into three major parts with the first part focused on the role of energy, especially nuclear energy, for global development. It also provides a brief history of SMRs. The second major part presents basic nuclear power plant terminology and then discusses in depth the attributes of SMRs that distinguish them from traditional nuclear plants. The third and final major section discusses the current interest in SMRs from a customer's perspective and delineates several remaining hurdles that must be addressed to achieve wide-spread SMR deployment. Provides decision-makers in governments, business, and research with the needed background on small nuclear power and an overview of the current situation Presents a balanced discussion of the many advantages of SMRs and the challenges they face Written by a highly respected expert in the nuclear industry

Renewable Heating and Cooling - Gerhard Stryi-Hipp 2015-11-20

Renewable Heating and Cooling: Technologies and Applications presents the latest information on the generation of heat for industry and domestic purposes, an area where a significant proportion of total energy is consumed. In Europe, this figure is estimated to be almost 50%, with the majority of heat generated by the consumption of fossil fuels. As there is a pressing need to increase the uptake of renewable heating and cooling (RHC) to reduce greenhouse gas emissions, this book provides a comprehensive and authoritative overview on the topic. Part One introduces key RHC technologies and discusses RHC in the context of global heating and cooling demand, featuring chapters on solar thermal process heat generation, deep geothermal energy, and solar cooling technologies. Part Two explores enabling technologies, special applications, and case studies with detailed coverage of thermal energy

storage, hybrid systems, and renewable heating for RHC, along with case studies in China and Sweden. Users will find this book to be an essential resource for lead engineers and engineering consultants working on renewable heating and cooling in engineering companies, as well as academics and R&D professionals in private research institutes who have a particular interest in the subject matter. Includes coverage on biomass, solar thermal, and geothermal renewable heating and cooling technologies
Features chapters on solar thermal process heat generation, deep geothermal energy, solar cooling technologies, and special applications
Presents case studies with detailed coverage of thermal energy storage, hybrid systems, and renewable heating for RHC
Explores enabling technologies and special applications

Safe and Secure Transport and Storage of Radioactive Materials - Ken Sorenson

2015-07-24

Safe and Secure Transport and Storage of

Radioactive Materials reviews best practice and emerging techniques in this area. The transport of radioactive materials is an essential operation in the nuclear industry, without which the generation of nuclear power would not be possible. Radioactive materials also often need to be stored pending use, treatment, or disposal. Given the nature of radioactive materials, it is paramount that transport and storage methods are both safe and secure. A vital guide for managers and general managers in the nuclear power and transport industries, this book covers topics including package design, safety, security, mechanical performance, radiation protection and shielding, thermal performance, uranium ore, fresh fuel, uranium hexafluoride, MOX, plutonium, and more. Uniquely comprehensive and systematic coverage of the packaging, transport, and storage of radioactive materials
Section devoted to spent nuclear fuels
Expert team of authors and editors

Waste to Energy Conversion Technology -

Naomi B Klinghoffer 2013-05-15

Increasing global consumerism and population has led to an increase in the levels of waste produced. Waste to energy (WTE) conversion technologies can be employed to convert residual wastes into clean energy, rather than sending these wastes directly to landfill. Waste to energy conversion technology explores the systems, technology and impacts of waste to energy conversion. Part one provides an introduction to WTE conversion and reviews the waste hierarchy and WTE systems options along with the corresponding environmental, regulatory and techno-economic issues facing this technology. Part two goes on to explore further specific aspects of WTE systems, engineering and technology and includes chapters on municipal solid waste (MSW) combustion plants and WTE systems for district heating. Finally, part three highlights pollution control systems for waste to energy technologies. Waste to energy conversion technology is a standard reference book for plant

managers, building engineers and consultants requiring an understanding of WTE technologies, and researchers, scientists and academics interested in the field. Reviews the waste hierarchy and waste to energy systems options along with the environmental and social impact of WTE conversion plants Explores the engineering and technology behind WTE systems including considerations of municipal solid waste (MSW) its treatment, combustion and gasification Considers pollution control systems for WTE technologies including the transformation of waste combustion facilities from major polluters to pollution sinks

Biomass Combustion Science, Technology and Engineering - Lasse Rosendahl 2013-04-04

The utilisation of biomass is increasingly important for low- or zero-carbon power generation. Developments in conventional power plant fuel flexibility allow for both direct biomass combustion and co-firing with fossil fuels, while the integration of advanced technologies

facilitates conversion of a wide range of biomass feedstocks into more readily combustible fuel. Biomass combustion science, technology and engineering reviews the science and technology of biomass combustion, conversion and utilisation. Part one provides an introduction to biomass supply chains and feedstocks, and outlines the principles of biomass combustion for power generation. Chapters also describe the categorisation and preparation of biomass feedstocks for combustion and gasification. Part two goes on to explore biomass combustion and co-firing, including direct combustion of biomass, biomass co-firing and gasification, fast pyrolysis of biomass for the production of liquids and intermediate pyrolysis technologies. Large-scale biomass combustion and biorefineries are then the focus of part three. Following an overview of large-scale biomass combustion plants, key engineering issues and plant operation are discussed, before the book concludes with a chapter looking at the role of biorefineries in

increasing the value of the end-products of biomass conversion. With its distinguished editor and international team of expert contributors, Biomass combustion science, technology and engineering provides a clear overview of this important area for all power plant operators, industrial engineers, biomass researchers, process chemists and academics working in this field. Reviews the science and technology of biomass combustion, conversion and utilisation Provides an introduction to biomass supply chains and feedstocks and outlines the principles of biomass combustion for power generation Describes the categorisation and preparation of biomass feedstocks for combustion and gasification

Gas-Turbine Power Generation - Paul Breeze
2016-02-24

Gas-Turbine Power Generation is a concise, up-to-date, and readable guide providing an introduction to gas turbine power generation technology. It includes detailed descriptions of

gas fired generation systems, demystifies the functions of gas fired technology, and explores the economic and environmental risk factors Engineers, managers, policymakers and those involved in planning and delivering energy resources will find this reference a valuable guide that will help them establish a reliable power supply as they also account for both social and economic objectives. Provides a concise, up-to-date, and readable guide on gas turbine power generation technology Focuses on the evolution of gas-fired power generation using gas turbines Evaluates the economic and environmental viability of the system with concise diagrams and accessible explanations

Membrane Reactors for Energy Applications and Basic Chemical Production - Angelo

Basile 2015-02-10

Membrane Reactors for Energy Applications and Basic Chemical Production presents a discussion of the increasing interest in membrane reactors that has emerged in recent years from both the

scientific and industrial communities, in particular their usage for energy applications and basic chemical production. Part One of the text investigates membrane reactors for syngas and hydrogen production, while Part Two examines membrane reactors for other energy applications, including biodiesel and bioethanol production. The final section of the book reviews the use of membrane reactors in basic chemical production, including discussions of the use of MRs in ammonia production and the dehydrogenation of alkanes to alkenes. Provides comprehensive coverage of membrane reactors as presented by a world-renowned team of experts Includes discussions of the use of membrane reactors in ammonia production and the dehydrogenation of alkanes to alkenes Tackles the use of membrane reactors in syngas, hydrogen, and basic chemical production Keen focus placed on the industry, particularly in the use of membrane reactor technologies in energy

Magnetic Fusion Energy - George Neilson

2016-06-02

Magnetic Fusion Energy: From Experiments to Power Plants is a timely exploration of the field, giving readers an understanding of the experiments that brought us to the threshold of the ITER era, as well as the physics and technology research needed to take us beyond ITER to commercial fusion power plants. With the start of ITER construction, the world's magnetic fusion energy (MFE) enterprise has begun a new era. The ITER scientific and technical (S&T) basis is the result of research on many fusion plasma physics experiments over a period of decades. Besides ITER, the scope of fusion research must be broadened to create the S&T basis for practical fusion power plants, systems that will continuously convert the energy released from a burning plasma to usable electricity, operating for years with only occasional interruptions for scheduled maintenance. Provides researchers in academia and industry with an authoritative overview of the significant fusion energy

experiments Considers the pathway towards future development of magnetic fusion energy power plants Contains experts contributions from editors and others who are well known in the field

Modern Gas Turbine Systems - Peter Jansohn
2013-08-31

Modern gas turbine power plants represent one of the most efficient and economic conventional power generation technologies suitable for large-scale and smaller scale applications. Alongside this, gas turbine systems operate with low emissions and are more flexible in their operational characteristics than other large-scale generation units such as steam cycle plants. Gas turbines are unrivalled in their superior power density (power-to-weight) and are thus the prime choice for industrial applications where size and weight matter the most. Developments in the field look to improve on this performance, aiming at higher efficiency generation, lower emission systems and more fuel-flexible operation to

utilise lower-grade gases, liquid fuels, and gasified solid fuels/biomass. Modern gas turbine systems provides a comprehensive review of gas turbine science and engineering. The first part of the book provides an overview of gas turbine types, applications and cycles. Part two moves on to explore major components of modern gas turbine systems including compressors, combustors and turbogenerators. Finally, the operation and maintenance of modern gas turbine systems is discussed in part three. The section includes chapters on performance issues and modelling, the maintenance and repair of components and fuel flexibility. Modern gas turbine systems is a technical resource for power plant operators, industrial engineers working with gas turbine power plants and researchers, scientists and students interested in the field. Provides a comprehensive review of gas turbine systems and fundamentals of a cycle Examines the major components of modern systems, including compressors, combustors and turbines

Discusses the operation and maintenance of component parts

The 2011 Fukushima Nuclear Power Plant Accident - Yotaro Hatamura 2014-11-28

In March 2011 the Fukushima nuclear power plant (NPP) in Japan was hit by an earthquake and subsequent tsunami which resulted in the release of significant amounts of radioactive material. The incident led to the suspension of nuclear programmes by a number of countries. This book provides a definitive account of the accident. Outlines the main sequence of events of the 2011 Fukushima nuclear power plant accident, considers the responses of central and local government, and evaluates the response of the plant owner TEPCO. Describes and assesses the effectiveness of the evacuation process and subsequent decontamination of the site and local area. Offers recommendations for improving the safe design and operation of nuclear power plants and considers the future of the Fukushima plant and nuclear power generation in Japan.

Advances in Membrane Technologies for Water Treatment - Angelo Basile 2015-02-28

Advances in Membrane Technologies for Water Treatment: Materials, Processes and Applications provides a detailed overview of advanced water treatment methods involving membranes, which are increasingly seen as effective replacements for a range of conventional water treatment methods. The text begins with reviews of novel membrane materials and advances in membrane operations, then examines the processes involved with improving membrane performance. Final chapters cover the application of membrane technologies for use in water treatment, with detailed discussions on municipal wastewater and reuse in the textile and paper industries. Provides a detailed overview of advanced water treatment methods involving membranes Coverage includes advancements in membrane materials, improvement in membrane performance, and their applications in water treatment Discusses the use of membrane

technologies in the production of drinking water, desalination, wastewater treatment, and recovery

Coal Power Plant Materials and Life Assessment - A. Shibli 2014-07-24

Due to their continuing role in electricity generation, it is important that coal power plants operate as efficiently and cleanly as possible. Coal Power Plant Materials and Life Assessment reviews the materials used in coal plants, and how they can be assessed and managed to optimize plant operation. Part I considers the structural alloys used in coal plants. Part II then reviews performance modelling and life assessment techniques, explains the inspection and life-management approaches that can be adopted to optimize long term plant operation, and considers the technical and economic issues involved in meeting variable energy demands. Summarizes key research on coal-fired power plant materials, their behavior under operational loads, and approaches to life assessment and

defect management Details the range of structural alloys used in coal power plants, and the life assessment techniques applicable to defect-free components under operational loads Reviews the life assessment techniques applicable to components containing defects and the approaches that can be adopted to optimize plant operation and new plant and component design

Commercial Aircraft Propulsion and Energy Systems Research - National Academies of Sciences, Engineering, and Medicine 2016-08-09

The primary human activities that release carbon dioxide (CO₂) into the atmosphere are the combustion of fossil fuels (coal, natural gas, and oil) to generate electricity, the provision of energy for transportation, and as a consequence of some industrial processes. Although aviation CO₂ emissions only make up approximately 2.0 to 2.5 percent of total global annual CO₂ emissions, research to reduce CO₂ emissions is urgent because (1) such reductions may be

legislated even as commercial air travel grows, (2) because it takes new technology a long time to propagate into and through the aviation fleet, and (3) because of the ongoing impact of global CO₂ emissions. Commercial Aircraft Propulsion and Energy Systems Research develops a national research agenda for reducing CO₂ emissions from commercial aviation. This report focuses on propulsion and energy technologies for reducing carbon emissions from large, commercial aircraft—single-aisle and twin-aisle aircraft that carry 100 or more passengers—because such aircraft account for more than 90 percent of global emissions from commercial aircraft. Moreover, while smaller aircraft also emit CO₂, they make only a minor contribution to global emissions, and many technologies that reduce CO₂ emissions for large aircraft also apply to smaller aircraft. As commercial aviation continues to grow in terms of revenue-passenger miles and cargo ton miles, CO₂ emissions are expected to increase. To

reduce the contribution of aviation to climate change, it is essential to improve the effectiveness of ongoing efforts to reduce emissions and initiate research into new approaches.

Alternative Fuels and Advanced Vehicle Technologies for Improved Environmental Performance - Richard Folkson 2022-07-29
Alternative Fuels and Advanced Vehicle Technologies for Improved Environmental Performance: Towards Zero Carbon Transportation, Second Edition provides a comprehensive view of key developments in advanced fuels and vehicle technologies to improve the energy efficiency and environmental impact of the automotive sector. Sections consider the role of alternative fuels such as electricity, alcohol and hydrogen fuel cells, as well as advanced additives and oils in environmentally sustainable transport. Other topics explored include methods of revising engine and vehicle design to improve

environmental performance and fuel economy and developments in electric and hybrid vehicle technologies. This reference will provide professionals, engineers and researchers of alternative fuels with an understanding of the latest clean technologies which will help them to advance the field. Those working in environmental and mechanical engineering will benefit from the detailed analysis of the technologies covered, as will fuel suppliers and energy producers seeking to improve the efficiency, sustainability and accessibility of their work. Provides a fully updated reference with significant technological advances and developments in the sector Presents analyses on the latest advances in electronic systems for emissions control, autonomous systems, artificial intelligence and legislative requirements Includes a strong focus on updated climate change predictions and consequences, helping the reader work towards ambitious 2050 climate change goals for the automotive industry

Handbook of Small Modular Nuclear Reactors -
Mario D Carelli 2014-09-22

Small modular reactors (SMRs) are an advanced, safe type of nuclear reactor technology that are suitable for small and medium sized applications including both power and heat generation. In particular, their use as individual units or in combination to scale-up capacity offer benefits in terms of siting, installation, operation, lifecycle and economics in comparison to the development of larger nuclear plant for centralised electricity power grids. Interest has increased in the research and development of SMRs for both developing countries as well as such additional cogeneration options as industrial/chemical process heat, desalination and district heating, and hydrogen production. This book reviews key issues in their development as well as international R&D in the field. Gives an overview of small modular reactor technology Reviews the design characteristics of integral pressurized water reactors and focuses

on reactor core and fuel technologies, key reactor system components, instrumentation and control, human-system interfaces and safety Considers the economics, financing, licensing, construction methods and hybrid energy systems of small modular reactors Describes SMR development activities worldwide, and concludes with a discussion of how SMR deployment can contribute to the growth of developing countries

Advanced Technologies for Gas Turbines -
National Academies of Sciences, Engineering,
and Medicine 2020-04-19

Leadership in gas turbine technologies is of continuing importance as the value of gas turbine production is projected to grow substantially by 2030 and beyond. Power generation, aviation, and the oil and gas industries rely on advanced technologies for gas turbines. Market trends including world demographics, energy security and resilience, decarbonization, and customer profiles are rapidly changing and influencing the future of these industries and gas turbine

technologies. Technology trends that define the technological environment in which gas turbine research and development will take place are also changing - including inexpensive, large scale computational capabilities, highly autonomous systems, additive manufacturing, and cybersecurity. It is important to evaluate how these changes influence the gas turbine industry and how to manage these changes moving forward. Advanced Technologies for Gas Turbines identifies high-priority opportunities for improving and creating advanced technologies that can be introduced into the design and manufacture of gas turbines to enhance their performance. The goals of this report are to assess the 2030 gas turbine global landscape via analysis of global leadership, market trends, and technology trends that impact gas turbine applications, develop a prioritization process, define high-priority research goals, identify high-priority research areas and topics to achieve the specified goals, and direct future research.

Findings and recommendations from this report are important in guiding research within the gas turbine industry and advancing electrical power generation, commercial and military aviation, and oil and gas production.

Advances in Biodiesel Production - R Luque
2012-02-22

Biodiesel is one of the main biofuels capable of substituting fossil fuel usage in compression ignition vehicles, and is used in a variety of fuel blends worldwide. First-generation biodiesel has been used in national markets for some time, with fuel quality standards in place for this purpose. There remain, however, several restrictions to sustainable and long term market development, which is influenced by many factors, including food vs. fuel pressures. The development of new generations of biodiesel, aimed at more sustainable and effective feedstock utilisation alongside improved production efficiency and fuel quality, is critical to the future both of this industry and of the

continuing use of biodiesel fuels in transportation. This book provides a timely reference on the advances in the development of biodiesel fuels, production processes and technologies. Part one reviews the life cycle sustainability assessment and socio-economic and environmental policy issues associated with advanced biodiesel production, as well as feedstocks and fuel quality standards. This coverage is extended in Part two, with chapters focussing on the development of methods and catalysts essential to the improvement and optimisation of biodiesel production processes and technologies. With its distinguished editors and international team of contributors, *Advances in biodiesel production* a standard reference for chemical, biochemical and industrial process engineers, as well as scientists and researchers in this important field. Provides a timely reference on the advances in the development of biodiesel fuels, production processes and technologies Reviews the life cycle sustainability

assessment and socio-economic and environmental policy issues associated with advanced biodiesel production, as well as feedstocks and fuel quality standards Discusses the development of methods and catalysts essential to the improvement and optimisation of biodiesel production processes and technologies Calcium and Chemical Looping Technology for Power Generation and Carbon Dioxide (CO₂) Capture - Paul Fennell 2015-05-21 Calcium and Chemical Looping Technology for Power Generation and Carbon Dioxide (CO₂) Capture reviews the fundamental principles, systems, oxygen carriers, and carbon dioxide carriers relevant to chemical looping and combustion. Chapters review the market development, economics, and deployment of these systems, also providing detailed information on the variety of materials and processes that will help to shape the future of CO₂ capture ready power plants. Reviews the fundamental principles, systems, oxygen carriers,

and carbon dioxide carriers relevant to calcium and chemical looping Provides a lucid explanation of advanced concepts and developments in calcium and chemical looping, high pressure systems, and alternative CO₂ carriers Presents information on the market development, economics, and deployment of these systems

Advances in Steam Turbines for Modern Power Plants - Tadashi Tanuma 2022-07-29

Advances in Steam Turbines for Modern Power Plants

Sustainable Energy from Salinity Gradients - Andrea Cipollina 2016-03-01

Salinity gradient energy, also known as blue energy and osmotic energy, is the energy obtainable from the difference in salt concentration between two feed solutions, typically sea water and river water. It is a large-scale renewable resource that can be harvested and converted to electricity. Efficient extraction of this energy is not straightforward, however.

Sustainable Energy from Salinity Gradients provides a comprehensive review of resources, technologies and applications in this area of fast-growing interest. Key technologies covered include pressure retarded osmosis, reverse electrodialysis and accumulator mixing. Environmental and economic aspects are also considered, together with the possible synergies between desalination and salinity gradient energy technologies. Sustainable Energy from Salinity Gradients is an essential text for R&D professionals in the energy & water industry interested in salinity gradient power and researchers in academia from post-graduate level upwards. For more than ten years the Editors have been sharing substantial research activities in the fields of renewable energy and desalination, successfully participating to a number of European Union research projects and contributing to the relevant scientific literature with more than 100 papers and 2 books on Desalination technologies and their coupling with

Renewable Energy. They are intensely working in the field of Salinity Gradient Power, carrying out research with specific focus on open-loop and closed-loop reverse electrodialysis and pressure retarded osmosis. Covers applications of pressure retarded osmosis, reverse electrodialysis, and capacitive mixing for salinity gradient power in one convenient volume Presents the environmental aspects and economics of salinity gradient energy Explores possible synergies between desalination and salinity gradient energy

Microbial Electrochemical and Fuel Cells - Keith Scott 2015-11-25

Microbial Electrochemical and Fuel Cells: Fundamentals and Applications contains the most updated information on bio-electrical systems and their ability to drive an electrical current by mimicking bacterial interactions found in nature to produce a small amount of power. One of the most promising features of the microbial fuel cell is its application to generate

power from wastewater, and its use in the treatment of water to remove contaminants, making it a very sustainable source of power generation that can feasibly find application in rural areas where providing more conventional sources of power is often difficult. The book explores, in detail, both the technical aspects and applications of this technology, and was written by an international team of experts in the field who provide an introduction to microbial fuel cells that looks at their electrochemical principles and mechanisms, explains the materials that can be used for the various sections of the fuel cells, including cathode and anode materials, and provides key analysis of microbial fuel cell performance looking at their usage in hydrogen production, waste treatment, and sensors, amongst other applications. Includes coverage of the types and principles of electrochemical cells Provides information on the construction of fuel cells and appropriate materials Presents the latest on this renewable source of energy and the

process for the treatment of waste water

Advances in Thermal Energy Storage Systems -

Luisa F. Cabeza 2014-10-31

Thermal energy storage (TES) technologies store thermal energy (both heat and cold) for later use as required, rather than at the time of production. They are therefore important counterparts to various intermittent renewable energy generation methods and also provide a way of valorising waste process heat and reducing the energy demand of buildings. This book provides an authoritative overview of this key area. Part one reviews sensible heat storage technologies. Part two covers latent and thermochemical heat storage respectively. The final section addresses applications in heating and energy systems. Reviews sensible heat storage technologies, including the use of water, molten salts, concrete and boreholes Describes latent heat storage systems and thermochemical heat storage Includes information on the monitoring and control of thermal energy storage

systems, and considers their applications in residential buildings, power plants and industry

Combined Cycle Systems for Near-Zero Emission Power Generation - Ashok D Rao
2012-04-12

Combined cycle power plants are one of the most promising ways of improving fossil-fuel and biomass energy production. The combination of a gas and steam turbine working in tandem to produce power makes this type of plant highly efficient and allows for CO₂ capture and sequestration before combustion. This book provides a comprehensive review of the design, engineering and operational issues of a range of advanced combined cycle plants. After introductory chapters on basic combined cycle power plant and advanced gas turbine design, the book reviews the main types of combined cycle system. Chapters discuss the technology, efficiency and emissions performance of natural gas-fired combined cycle (NGCC) and integrated gasification combined cycle (IGCC) as well as

novel humid air cycle, oxy-combustion turbine cycle systems. The book also reviews pressurised fluidized bed combustion (PFBC), externally fired combined cycle (EFCC), hybrid fuel cell turbine (FC/GT), combined cycle and integrated solar combined cycle (ISCC) systems. The final chapter reviews techno-economic analysis of combined cycle systems. With its distinguished editor and international team of contributors, Combined cycle systems for near-zero emission power generation is a standard reference for both industry practitioners and academic researchers seeking to improve the efficiency and environmental impact of power plants. Provides a comprehensive review of the design, engineering and operational issues of a range of advanced combined cycle plants Introduces basic combined cycle power plant and advanced gas turbine design and reviews the main types of combined cycle systems Discusses the technology, efficiency and emissions performance of natural gas-fired combined cycle (NGCC) systems and

integrated gasification combined cycle (IGCC) systems, as well as novel humid air cycle systems and oxy-combustion turbine cycle systems

Fuel Flexible Energy Generation - John Oakey
2015-12-08

Fuel Flexible Energy Generation: Solid, Liquid and Gaseous Fuels provides updated information on flexible fuel energy generation, the process by which one or more fuels can be combusted in the same boiler or turbine to generate power. By adapting or building boilers and turbines to accept multiple fuel sources, they can be co-fired with biomass and waste derived fuels, allowing a reduction in carbon output, thus providing cleaner energy. Fuel flexibility is becoming more important in a world of diminishing fossil fuel stocks. Many countries are investing in the development of more efficient fuel flexible boilers and turbines, and their use is becoming more prevalent in industry as well. This book provides comprehensive coverage of flexible fuel energy

generation across all potential fuel types, and was written by a selection of experts in the field who discuss the types of fuels which can be used in fuel flexible energy generation, from solid fuels to biomass fuels, the preparation of fuels to be used in fuel flexible operations, that includes their handling and transport, and combustion and conversion technologies with chapters ranging from large-scale coal gasification to technology options and plant design issues. Focuses on fuel flexibility across all potential fuel types Includes thorough treatment of the technology being developed to allow for fuel flexibility Written by leading experts in the field Provides an essential text for R&D managers in firms which produce boilers or turbines, those who work in the fuel industry, and academics working in engineering departments on energy generation

Gas Turbines for Electric Power Generation - S. Can Gülen 2019-02-14

Everything you wanted to know about industrial gas turbines for electric power generation in one

source with hard-to-find, hands-on technical information.

Gas Turbines for Electric Power Generation - S. Can Gülen 2019-02-14

In this essential reference, both students and practitioners in the field will find an accessible discussion of electric power generation with gas turbine power plants, using quantitative and qualitative tools. Beginning with a basic discussion of thermodynamics of gas turbine cycles from a second law perspective, the material goes on to cover with depth an analysis of the translation of the cycle to a final product, facilitating quick estimates. In order to provide readers with the knowledge they need to design turbines effectively, there are explanations of simple and combined cycle design considerations, and state-of-the-art, performance prediction and optimization techniques, as well as rules of thumb for design and off-design performance and operational flexibility, and simplified calculations for myriad design and off-

design performance. The text also features an introduction to proper material selection, manufacturing techniques, and construction, maintenance, and operation of gas turbine power plants.

High Temperature Superconductors (HTS) for Energy Applications - Ziad Melhem 2011-12-21

High temperature superconductors (HTS) offer many advantages through their application in electrical systems, including high efficiency performance and high throughput with low-electrical losses. While cryogenic cooling and precision materials manufacture is required to achieve this goal, cost reductions without significant performance loss are being achieved through the advanced design and development of HTS wires, cables and magnets, along with improvements in manufacturing methods. This book explores the fundamental principles, design and development of HTS materials and their practical applications in energy systems. Part one describes the fundamental science, engineering

and development of particular HTS components such as wires and tapes, cables, coils and magnets and discusses the cryogenics and electromagnetic modelling of HTS systems and materials. Part two reviews the types of energy applications that HTS materials are used in, including fault current limiters, power cables and energy storage, as well as their application in rotating machinery for improved electrical efficiencies, and in fusion technologies and accelerator systems where HTS magnets are becoming essential enabling technologies. With its distinguished editor and international team of expert contributors, *High temperature superconductors (HTS) for energy applications* is an invaluable reference tool for anyone involved or interested in HTS materials and their application in energy systems, including materials scientists and electrical engineers, energy consultants, HTS materials manufacturers and designers, and researchers and academics in this field. Discusses fundamental issues and

developments of particular HTS components
Comprehensively reviews the design and development of HTS materials and then applications in energy systems Reviews the use of HTS materials and cabling transmissions, fault alignment limiters, energy storage, generators and motors, fusion and accelerator

Reprocessing and Recycling of Spent Nuclear Fuel - Robin Taylor 2015-04-18

Reprocessing and Recycling of Spent Nuclear Fuel presents an authoritative overview of spent fuel reprocessing, considering future prospects for advanced closed fuel cycles. Part One introduces the recycling and reprocessing of spent nuclear fuel, reviewing past and current technologies, the possible implications of Generation IV nuclear reactors, and associated safety and security issues. Parts Two and Three focus on aqueous-based reprocessing methods and pyrochemical methods, while final chapters consider the cross-cutting aspects of engineering and process chemistry and the potential for

implementation of advanced closed fuel cycles in different parts of the world. Expert introduction to the recycling and reprocessing of spent nuclear fuel Detailed overview of past and current technologies, the possible implications of Generation IV nuclear reactors, and associated safety and security issues A lucid exploration of aqueous-based reprocessing methods and pyrochemical methods

Gas Turbine Engineering Handbook - Meherwan P. Boyce 2017-09-01

The Gas Turbine Engineering Handbook has been the standard for engineers involved in the design, selection, and operation of gas turbines. This revision includes new case histories, the latest techniques, and new designs to comply with recently passed legislation. By keeping the book up to date with new, emerging topics, Boyce ensures that this book will remain the standard and most widely used book in this field. The new Third Edition of the Gas Turbine Engineering Hand Book updates the book to

cover the new generation of Advanced gas Turbines. It examines the benefit and some of the major problems that have been encountered by these new turbines. The book keeps abreast of the environmental changes and the industries answer to these new regulations. A new chapter on case histories has been added to enable the engineer in the field to keep abreast of problems that are being encountered and the solutions that have resulted in solving them.

Comprehensive treatment of Gas Turbines from Design to Operation and Maintenance. In depth treatment of Compressors with emphasis on surge, rotating stall, and choke; Combustors with emphasis on Dry Low NOx Combustors; and Turbines with emphasis on Metallurgy and new cooling schemes. An excellent introductory book for the student and field engineers A special maintenance section dealing with the advanced gas turbines, and special diagnostic charts have been provided that will enable the reader to troubleshoot problems he encounters in the field

The third edition consists of many Case Histories of Gas Turbine problems. This should enable the field engineer to avoid some of these same generic problems

Compendium of Hydrogen Energy - Velu Subramani 2015-05-23

Compendium of Hydrogen Energy: Hydrogen Production and Purification, the first text in a four-volume series, focuses on the production of hydrogen. As many experts believe that the hydrogen economy will eventually replace the fossil fuel economy as our primary source of energy, the text provides a timely discussion on this interesting topic. The text details the methods of hydrogen production using fossil fuels, also exploring sustainable extraction methods of hydrogen production from water and hydrogen purification processes. Provides a comprehensive understanding of the current methods used in the production of hydrogen Discusses the hydrogen economy and its potential to replace fossil fuels as our primary

source of energy Details the methods of hydrogen production using fossil fuels, also exploring sustainable extraction methods of hydrogen production from water and hydrogen purification processes

Advances in Battery Technologies for Electric Vehicles - Bruno Scrosati 2015-05-25

Advances in Battery Technologies for Electric Vehicles provides an in-depth look into the research being conducted on the development of more efficient batteries capable of long distance travel. The text contains an introductory section on the market for battery and hybrid electric vehicles, then thoroughly presents the latest on lithium-ion battery technology. Readers will find sections on battery pack design and management, a discussion of the infrastructure required for the creation of a battery powered transport network, and coverage of the issues involved with end-of-life management for these types of batteries. Provides an in-depth look into new research on the development of more

efficient, long distance travel batteries Contains an introductory section on the market for battery and hybrid electric vehicles Discusses battery pack design and management and the issues involved with end-of-life management for these types of batteries

Advances in Batteries for Medium and Large-Scale Energy Storage - C Menictas 2014-12-09
As energy produced from renewable sources is increasingly integrated into the electricity grid, interest in energy storage technologies for grid stabilisation is growing. This book reviews advances in battery technologies and applications for medium and large-scale energy storage. Chapters address advances in nickel, sodium and lithium-based batteries. Other chapters review other emerging battery technologies such as metal-air batteries and flow batteries. The final section of the book discusses design considerations and applications of batteries in remote locations and for grid-scale storage. Reviews advances in battery

technologies and applications for medium and large-scale energy storage Examines battery types, including zing-based, lithium-air and vanadium redox flow batteries Analyses design issues and applications of these technologies *Polymer Electrolyte Membrane and Direct Methanol Fuel Cell Technology* - Christoph Hartnig 2012-03-19

Polymer electrolyte membrane fuel cells (PEMFCs) and direct methanol fuel cells (DMFCs) technology are promising forms of low-temperature electrochemical power conversion technologies that operate on hydrogen and methanol respectively. Featuring high electrical efficiency and low operational emissions, they have attracted intense worldwide commercialization research and development efforts. These R&D efforts include a major drive towards improving materials performance, fuel cell operation and durability. In situ characterization is essential to improving performance and extending operational lifetime

through providing information necessary to understand how fuel cell materials perform under operational loads. This two volume set reviews the fundamentals, performance, and in situ characterization of PEMFCs and DMFCs. Volume 1 covers the fundamental science and engineering of these low temperature fuel cells, focusing on understanding and improving performance and operation. Part one reviews systems fundamentals, ranging from fuels and fuel processing, to the development of membrane and catalyst materials and technology, and gas diffusion media and flowfields, as well as life cycle aspects and modelling approaches. Part two details performance issues relevant to fuel cell operation and durability, such as catalyst ageing, materials degradation and durability testing, and goes on to review advanced transport simulation approaches, degradation modelling and experimental monitoring techniques. With its international team of expert contributors, *Polymer electrolyte membrane and*

direct methanol fuel cell technology Volumes 1 & 2 is an invaluable reference for low temperature fuel cell designers and manufacturers, as well as materials science and electrochemistry researchers and academics. Covers the fundamental science and engineering of polymer electrolyte membrane fuel cells (PEMFCs) and direct methanol fuel cells (DMFCs), focusing on understanding and improving performance and operation Reviews systems fundamentals, ranging from fuels and fuel processing, to the development of membrane and catalyst materials and technology, and gas diffusion media and flowfields, as well as life cycle aspects and modelling approaches Details performance issues relevant to fuel cell operation and durability, such as catalyst ageing, materials degradation and durability testing, and reviews advanced transport simulation approaches, degradation modelling and experimental monitoring techniques

Superconductors in the Power Grid - C. Rey

2015-04-20

Superconductors offer high throughput with low electric losses and have the potential to transform the electric power grid. Transmission networks incorporating cables of this type could, for example, deliver more power and enable substantial energy savings. Superconductors in the Power Grid: Materials and Applications provides an overview of superconductors and their applications in power grids. Sections address the design and engineering of cable systems and fault current limiters and other emerging applications for superconductors in the power grid, as well as case studies of industrial applications of superconductors in the power grid. Expert editor from highly respected US government-funded research centre Unique focus on superconductors in the power grid

Comprehensive coverage

[Aircraft Propulsion and Gas Turbine Engines](#) -

Ahmed F. El-Sayed 2008-02-27

The escalating use of aircraft in the 21st century

demands a thorough understanding of engine propulsion concepts, including the performance of aero engines. Among other critical activities, gas turbines play an extensive role in electric power generation, and marine propulsion for naval vessels and cargo ships. In the most exhaustive volume to date, this text examines the foundation of aircraft propulsion: aerodynamics interwoven with thermodynamics, heat transfer, and mechanical design. With a finely focused approach, the author devotes each chapter to a particular engine type, such as ramjet and pulsejet, turbojet, and turbofan. Supported by actual case studies, he illustrates engine performance under various operating conditions. Part I discusses the history, classifications, and performance of air breathing engines. Beginning with Leonardo and continuing on to the emergence of the jet age and beyond, this section chronicles inventions up through the 20th century. It then moves into a detailed discussion of different engine types, including

pulsejet, ramjet, single- and multi-spool turbojet, and turbofan in both subsonic and supersonic applications. The author discusses Vertical Take Off and Landing aircraft, and provides a comprehensive examination of hypersonic scramjet and turbo ramjet engines. He also analyzes the different types of industrial gas turbines having single- and multi-spool with intercoolers, regenerators, and reheaters. Part II investigates the design of rotating compressors and turbines, and non-rotating components, intakes, combustion chambers, and nozzles for all modern jet propulsion and gas turbine engine systems, along with their performance. Every chapter concludes with illustrative examples followed by a problems section; for greater clarity, some provide a listing of important mathematical relations.

Gas Turbine Combined Cycle Power Plants -

S. Can Gülen 2019-12-06

This book covers the design, analysis, and optimization of the cleanest, most efficient fossil

fuel-fired electric power generation technology at present and in the foreseeable future. The book contains a wealth of first principles-based calculation methods comprising key formulae, charts, rules of thumb, and other tools developed by the author over the course of 25+ years spent in the power generation industry. It is focused exclusively on actual power plant systems and actual field and/or rating data providing a comprehensive picture of the gas turbine combined cycle technology from performance and cost perspectives. Material presented in this book is applicable for research and development studies in academia and government/industry laboratories, as well as practical, day-to-day problems encountered in the industry (including OEMs, consulting engineers and plant operators).

Absorption-Based Post-Combustion Capture of Carbon Dioxide - Paul Feron 2016-05-27

Absorption-Based Post-Combustion Capture of Carbon Dioxide provides a comprehensive and authoritative review of the use of absorbents for

post-combustion capture of carbon dioxide. As fossil fuel-based power generation technologies are likely to remain key in the future, at least in the short- and medium-term, carbon capture and storage will be a critical greenhouse gas reduction technique. Post-combustion capture involves the removal of carbon dioxide from flue gases after fuel combustion, meaning that carbon dioxide can then be compressed and cooled to form a safely transportable liquid that can be stored underground. Provides researchers in academia and industry with an authoritative overview of the amine-based methods for carbon dioxide capture from flue gases and related processes Editors and contributors are well known experts in the field Presents the first book on this specific topic

Compendium of Hydrogen Energy - Michael Ball 2015-08-28

Compendium of Hydrogen Energy Volume 4: Hydrogen Use, Safety and the Hydrogen Economy focuses on the uses of hydrogen. As

many experts believe the hydrogen economy will, at some point, replace the fossil fuel economy as the primary source of the world's energy, this book investigates the uses of this energy, from transport, to stationary and portable applications, with final sections discussing the difficulties and possibilities of the widespread adoption of the hydrogen economy. Written by both leading academics in the fields of sustainable energy and experts from the world of industry Part of a very comprehensive compendium which across four volumes looks at the entirety of the hydrogen energy economy Covers a wide array of hydrogen uses, and details safety tactics, hydrogen applications in transport, and the hydrogen economy as a whole

Nuclear Fuel Cycle Science and Engineering
- Ian Crossland 2012-09-21

The nuclear fuel cycle is characterised by the wide range of scientific disciplines and technologies it employs. The development of ever more integrated processes across the many

stages of the nuclear fuel cycle therefore confronts plant manufacturers and operators with formidable challenges. Nuclear fuel cycle science and engineering describes both the key features of the complete nuclear fuel cycle and the wealth of recent research in this important field. Part one provides an introduction to the nuclear fuel cycle. Radiological protection, security and public acceptance of nuclear technology are considered, along with the economics of nuclear power. Part two goes on to explore materials mining, enrichment, fuel element design and fabrication for the uranium and thorium nuclear fuel cycle. The impact of nuclear reactor design and operation on fuel element irradiation is the focus of part three, including water and gas-cooled reactors, along with CANDU and Generation IV designs. Finally, part four reviews spent nuclear fuel and radioactive waste management. With its distinguished editor and international team of expert contributors, Nuclear fuel cycle science and engineering provides an

important review for all those involved in the design, fabrication, use and disposal of nuclear fuels as well as regulatory bodies and researchers in this field. Provides a comprehensive and holistic review of the complete nuclear fuel cycle Reviews the issues

presented by the nuclear fuel cycle, including radiological protection and security, public acceptance and economic analysis Discusses issues at the front-end of the fuel cycle, including uranium and thorium mining, enrichment and fuel design and fabrication