Exergy Analysis Of Combined Cycle Cogeneration Gcgw

Thermodynamic Analysis and Optimization of Geothermal Power Plants

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Potential for Industrial Energy-Efficiency Improvement in the Long Term
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**Thermodynamic Analysis and Optimization of Geothermal Power Plants**

This book is the proceedings of the International Conference on Power Engineering-2007. The fields of this book include power engineering and relevant environmental issues. The recent technological advances in power engineering and related areas are introduced. This book is valuable for researchers, engineers and students majoring in power engineering.

**Exergy Method**

Exergetic Analysis

**Efficiency Analysis of Combined Cycled Power Plant**

The Exergy Method of Thermal Plant Analysis aims to discuss the history, related concepts, applications, and development of the Exergy Method - analysis technique that uses the Second Law of Thermodynamics as the basis of evaluation of thermodynamic loss. The book, after an introduction to thermodynamics and its related concepts, covers concepts related to exergy, such as physical and chemical exergy, exergy concepts for a control method and a closed-system analysis, the exergy analysis of simple processes, and the thermocentric applications of exergy. A seven-part appendix is also included. Appendices A-D covers miscellaneous information on exergy, and Appendix E features charts of thermodynamic properties.

**The Exergy Analysis On A Natural Gas Based Combined Cycle Power Plant**

Although the exergy method has been featured as the subject of many publishing papers in scientific and engineering journals and at conferences, very few comprehensive books on this subject have been published so far. Practical Approach to Exergy and Thermo-economic Analyses of Industrial Processes details the exergetic and thermo-economic analyses of industrial processes using Aspen Plus and a novel Microsoft Excel Application developed by the authors which can be applied to industrial processes across the board. Employing a practical approach to an innovative and complex energy process, every chapter contains extensive explanations of a complex and real case and numerous examples whose solution demonstrates the application of theory to a wide range of real and practical problems. Illustrations, tables and graphs support and illustrate the new methodology to build a deep understanding of the real employment of the fuel used and the cost formation and increase inside the process. Practical Approach to Exergy and Thermo-economic Analyses of Industrial Processes provides users, students and practitioners of process analysis, power plant design and fuel use optimization, with a broad introduction and approach to computer aided process optimization. It also serves as a comprehensive guide to the operational application of the MHBT to real cases analysis.

**Optimization of Energy Systems**
Discover a straightforward and holistic look at energy conversion and conservation processes using the exergy concept with this thorough text. Explains the fundamental energy conversion processes in numerous diverse systems, ranging from jet engines and nuclear reactors to human bodies. Provides examples for applications to practical energy conversion processes and systems that use our naturally occurring energy resources, such as fossil fuels, solar energy, wind, geothermal, and nuclear fuels. With more than one-hundred diverse cases and solved examples, readers will be able to perform optimizations for a cleaner environment, a sustainable energy future, and affordable energy generation. An essential tool for practicing scientists and engineers who work or do research in the area of energy and exergy, as well as graduate students and faculty in chemical engineering, mechanical engineering and physics.

Practical Approach to Exergy and Thermoeconomic Analyses of Industrial Processes

This book does not give a prediction of what the efficiency will be of the energy use of industrial processes in the future. However, it does give an exploration of limits to the efficiency of current processes and an indication of what might be achieved if new technologies can be developed. At the Department of Science, Technology and Society of Utrecht University research had been done to the opportunities for improvement of the energy efficiency in the short term since the 1980's. This had resulted in a comprehensive database on energy efficient measures. This database and a possible application are described in Chapter 3 of this book. The use of the database induced new research themes around efficiency improvement, e.g. concerning barriers for implementation of measures. It was around 1993 that I did a preliminary study to the potential for efficiency improvement in the long term. Historical analysis had shown us that the short term potential stayed constant over the years. It seemed to be replenished by the introduction of new technologies. This lead to the question whether there are limits to the efficiency, taking into account both thermodynamic considerations and ideas on the development and dissemination of new technologies.

Gas Turbines for Electric Power Generation

Exergy, Energy System Analysis, and Optimization theme is a component of the Encyclopedia of Energy Sciences, Engineering and Technology Resources which is part of the global Encyclopedia of Life Support Systems (EOLSS), an integrated compendium of twenty one Encyclopedias. These three volumes are organized into five different topics which represent the main scientific areas of the theme: 1. Exergy and Thermodynamic Analysis; 2. Thermoeconomic Analysis; 3. Modeling, Simulation and Optimization in Energy Systems; 4. Artificial Intelligence and Expert Systems in Energy Systems Analysis; 5. Sustainability Considerations in the Modeling of Energy Systems. Fundamentals and applications of characteristic methods are presented in these volumes. These three volumes are aimed at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Exergy for A Better Environment and Improved Sustainability 1

In this thesis, several configurations of combined cycle cogeneration systems proposed by the author and an existing system, the Bilkent Combined Cycle Cogeneration Plant, are investigated by energy, exergy and thermoeconomic analyses. In each of these configurations, varying steam demand is considered rather than fixed steam demand. Basic thermodynamic properties of the systems are determined by energy analysis utilizing main operation conditions. Exergy destructions within the system and exergy losses to environment are investigated to determine thermodynamic inefficiencies in the system and to assist in guiding future improvements in the plant. Among the different approaches for thermoeconomic analysis in literature, SPECO method is applied. Since the systems have more than one product (process steam and electrical power), systems are divided into several subsystems and cost balances are applied together with the auxiliary equations. Hence, cost of each product is calculated. Comparison of the configurations in terms of performance assessment parameters and costs per unit of exergy are also given in this thesis.

Steam Power Engineering

An essential resource for optimizing energy systems to enhance design capability, performance and sustainability Optimizathion of Energy Systems comprehensively describes the thermodynamic modelling, analysis and optimization of numerous types of energy systems in various applications. It provides a new understanding of the system and the process of defining proper objective functions for determination of the most suitable design parameters for achieving enhanced efficiency, cost effectiveness and sustainability. Beginning with a general summary of thermodynamics, optimization techniques and optimization methods for thermal components, the book goes on to describe how to determine the most appropriate design parameters for more complex energy systems using various optimization methods. The results of each chapter provide potential tools for design, analysis, performance improvement, and greenhouse gas emissions reduction. Key features: Comprehensive coverage of the modelling, analysis and optimization of many energy systems for a variety of applications. Examples, practical applications and case studies to put theory into practice. Study problems at the end of each chapter that foster critical thinking and skill development. Written in an easy-to-follow style, starting with simple systems and moving to advanced energy systems and their complexities. A unique resource for understanding cutting-edge research in the thermodynamic analysis and optimization of a wide range of energy systems, Optimization of Energy Systems is suitable for graduate and senior undergraduate students, researchers, engineers, practitioners, and scientists in the area of energy systems.
Applications of Machine Learning

Combined Power Plants

Exergetic, Energetic and Environmental Dimensions

This book deals with exergy and its applications to various energy systems and applications as a potential tool for design, analysis and optimization, and its role in minimizing and/or eliminating environmental impacts and providing sustainable development. In this regard, several key topics ranging from the basics of the thermodynamic concepts to advanced exergy analysis techniques in a wide range of applications are covered as outlined in the contents. Offers comprehensive coverage of exergy and its applications, along with the most up-to-date information in the area with recent developments Connects exergy with three essential areas in terms of energy, environment and sustainable development Provides a number of illustrative examples, practical applications, and case studies Written in an easy-to-follow style, starting from the basics to advanced systems

The Exergy Method of Thermal Plant Analysis

Covers the latest advances in the design and operation of large and small steam power plants.

Application of Exergy

Exergetic Analysis

This thesis deals with modelling and performance enhancements of a gas-turbine combined cycle power plant. A clean and safe energy is the greatest challenges to meet the requirements of green environment. These requirements given way the long time governing authority of steam turbine (ST) in the world power generation, and gas turbine (GT) and its combined cycle (CCGT) will replace it. Therefore, it is necessary to predict the characteristics of the CCGT system and optimize its operating strategy by developing a simulation system. Several configurations of the GT and CCGT plants systems are proposed by thermal analysis. The integrated model and simulation code for exploiting the performance of gas turbine and CCGT power plant are developed utilizing MATLAB code. New strategies for GT and CCGT power plant's operational modelling and optimizations are suggested for power plant operation, to improve overall performance. The effect of various enhancing strategies on the performance of the CCGT power plant (two-shaft, intercooler, regenerative, reheat, and multi-pressure heat recovery steam generator (HRSG)) based on the real GT and CCGT power plants. An extensive thermodynamic analysis of the modifications of the most common configuration's enhancements has been carried out. The performance code for heavy-duty GT and CCGT power plants are validated with the real power plant of Baiji GT and MARAFIQ CCGT plants the results have been satisfactory. The simulating results show that the reheated GT has a higher power (388MW) while the higher thermal efficiency occurs in the regenerative GT (52%) with optimal pressure ratio and turbine inlet temperature. The performance enhancing strategies results show that the higher power output occurs in the intercooler-reheat GT strategy (404MW). Furthermore, the higher thermal efficiency (56.9%) and lower fuel consumption (0.13kg/kWh) occur in the intercooler-regenerative-reheat GT strategy. The analyses of the HRSG configurations show that the maximum power output (1238MW) occurred in the supplementary triple pressure with reheat CCGT while the overall efficiency was about 56.6%. The intercooler-reheat CCGT strategy has higher power output (1637MW) and the higher overall thermal efficiency (59.4%) and lower fuel consumption (0.047kg/kWh) occur with the regenerative-reheat CCGT strategy. The simulation result shows that the proposed GT system improved 19% of thermal efficiency and 22% of power output. In addition, the proposed CCGT system improved 4.6% of thermal efficiency for and 22.5% of power output. The optimization result shows that the optimum power (1280MW) and the overall thermal efficiency (65%) of the supplementary triple pressure with reheat CCGT. Therefore, the optimization procedure is reasonably accurate and efficient. Thus, the operation conditions and ambient temperature are strongly influenced on the overall performance of the GT and CCGT. The optimum efficiency and power are found at higher turbine inlet temperatures. It can be comprehended that the developed models are powerful tools for estimating the overall performance of the CCGT plants. The energy and exergy analysis models for the GT and CCGT plants are highly recommended for predicting them performance based on inlet air cooling system.

Thermodynamic Optimization of Complex Energy Systems

Thermodynamic Analysis and Optimization of Geothermal Power Plants guides researchers and engineers on the analysis and optimization of geothermal power plants through conventional and innovative methods. Coverage encompasses the fundamentals, thermodynamic analysis, and optimization of geothermal power plants. Advanced thermodynamic analysis tools such as exergy analysis, thermo-economic analysis, and several thermodynamic optimization methods are covered in-depth for different configurations of geothermal power plants through case studies. Interdisciplinary research with relevant economic and environmental dimensions are addressed in many of the studies, along with optimization studies aimed at better efficiency, lower cost and lower environmental impact. Addresses the complexities of thermodynamic assessment in almost all operational plant configurations, including solar-geothermal and multi-generation power plants Includes an exemplary range of case studies, from basic to integrated Provides modern optimization methods, including entropy-based,
Exergy Analysis of Combined Cycle Cogeneration


This edited book looks at recent studies on interdisciplinary research related to exergy, energy, and the environment. This topic is of prime significance - there is a strong need for practical solutions through better design, analysis and assessment in order to achieve better efficiency, environment and sustainability. Exergetic, Energetic and Environmental Dimensions covers a number of topics ranging from thermodynamic optimization of energy systems, to the environmental impact assessment and clean energy, offering readers a comprehensive reference on analysis, modeling, development, experimental investigation, and improvement of many micro to macro systems and applications, ranging from basic to advanced categories. Its comprehensive content includes: Comprehensive coverage of development of systems considering exergy, energy, and environmental issues, along with the most up-to-date information in the area, plus recent developments New developments in the area of exergy, including recent debate involving the shaping of future directions and priorities for better environment, sustainable development and energy security Provides a number of illustrative examples, practical applications, and case studies Introduces recently developed technological and strategic solutions and engineering applications for professionals in the area Provides numerous engineering examples and applications on exergy Offers a variety of problems that foster critical thinking and skill development

Exergy Analysis of Thermal, Chemical, and Metallurgical Processes

Bridging the gap between concepts derived from Second Law of Thermodynamics and their application to Engineering practice, the property exergy and the exergy balance can be a tool for analyzing and improving the performance of energy conversion processes. With the exergy analysis it is possible to evaluate the performance of energy conversion processes not only on a thermodynamics basis but also by including production costs and environmental aspects and impacts of the studied processes. This comprehensive approach of the use of energy has, as one of the most important feature, the identification of sustainable ways of energy resources utilization. Based on the fundamentals of the exergy concept, its calculation, graphical representations and exergy balances evaluation, Exergy: Production Cost And Renewability describes the application of detailed exergy and thermoeconomic analysis to power plants and polygeneration systems, petroleum production and refining plants (including hydrogen production), chemical plants, biofuel production routes, combined production of ethanol and electricity, aircraft systems design, environmental impact mitigation processes and human body behavior. The presented case studies aim at providing students, researchers and engineers with guidelines to the utilization of the exergy and thermo-economic analysis to model, simulate and optimize real processes and industrial plants.

Efficiency of Biomass Energy

This is Describes about the Operational Aspects of Combined Cycle Power Plant. Main concentration is on Performance Analysis and Thermodynamic aspects of all the sub systems. The effective heat utilization and accounting of Exergy in the work consumable devices and work extractable. The improvement aspects of various power plants based on combined cycle has been discussed. This book contains the information regarding the working, improving the efficiency of a combined cycle power plant through exergy analysis. In the combined cycle power plants, natural gas is used as major fuel. These plants can achieve higher efficiency in converting fuel to electricity which makes it possible for relatively high priced fuel like natural gas to be competitive for intermediate or base loads

Combined Power Plants

It is widely believed that a large proportion of greenhouse gas emissions originated anthropogenically from the use of fossil fuels with additional contributions coming from manufactured materials, deforestation, soil erosion, and agriculture (including livestock). The global society actively supports measures to create a flexible and low-carbon energy economy to attenuate climate change and its devastating environmental consequences. In this Special Issue, the recent advancements in the next-generation thermochemical conversion processes for solid fuels and renewable energies (e.g., the operational flexibility of co-combustion of biomass and lignite, integrated solar combined cycle power plants, and advanced gasification systems such as the sorption-enhanced gasification and the chemical looping gasification) were shown.

Combined-cycle Gas & Steam Turbine Power Plants

This book is a unique, multidisciplinary effort to apply rigorous thermodynamics fundamentals, a disciplined scholarly approach, to problems of sustainability, energy, and resource uses. Applying thermodynamic thinking to problems of sustainable behavior is a significant advantage in bringing order to ill-defined questions with a great variety of proposed solutions, some of which are more destructive than the original problem. The articles are pitched at a level accessible to advanced undergraduates and graduate students in courses on sustainability, sustainable engineering, industrial ecology, sustainable manufacturing, and green engineering. The timeliness of the topic, and the urgent need for solutions make this book attractive to general readers and specialist researchers as well. Top international figures from many disciplines, including engineers, ecologists, economists, physicists, chemists, policy experts and
industrial ecologists among others make up the impressive list of contributors.

**EXERGY ANALYSIS OF COMBINED CYCLE COGENERATION SYSTEMS.**

Everything you wanted to know about industrial gas turbines for electric power generation in one source with hard-to-find, hands-on technical information.

**Applied Thermodynamics**

**Closed-cycle Gas Turbines**

This book covers applications of machine learning in artificial intelligence. The specific topics covered include human language, heterogeneous and streaming data, unmanned systems, neural information processing, marketing and the social sciences, bioinformatics and robotics, etc. It also provides a broad range of techniques that can be successfully applied and adopted in different areas. Accordingly, the book offers an interesting and insightful read for scholars in the areas of computer vision, speech recognition, healthcare, business, marketing, and bioinformatics.

**Thermochemical Conversion Processes for Solid Fuels and Renewable Energies**

Power plant performance can be assessed by the method of thermodynamic analysis. The goal of this thesis is to perform a thermodynamic analysis on the University of Massachusetts' Combined Heat and Power (CHP) District Heating System. Energy and exergy analyses are performed based on the first and second laws of thermodynamics for power generation systems that include a 10-MW Solar combustion gas turbine, a 4-MW low pressure steam turbine, a 2-MW high pressure steam turbine, a 100,000 pph heat recovery steam generator (HRSG), three 125,000 pph package boilers, and auxiliary equipment. The University of Massachusetts' CHP plant delivers all of the campus' steam and nearly all its electricity to the more than 200 buildings and nearly 10 million gross square feet of building space. Two 20-inch main steam transmission lines connect the plant to the campus. On an annual basis the plant generates approximately 1,100,000,000 pounds of steam and 100,000,000 kWh of electric power. The plant has a SCADA (Supervisory Control and Data Acquisition) system. Rockwell Automation's RSLinx OPC (Object Linking and Embedding for Process Control) server acquires data from up to 675 field instruments in the plant which is used for carrying out the analyses. The latest pollution control technologies, including advanced combustion turbine low NOx burners, advanced Selective Catalytic Reduction and Oxidation Catalyst pollution control technologies are employed in the plant. System efficiencies are calculated for a wide range of component operating loads. Factors affecting efficiency of the CHP district heating system are analyzed. In the analysis, actual system data is used to assess the district heating system performance, energy and exergy efficiencies and exergy losses. Energy and exergy calculations are conducted for the whole year on an hourly basis. Factors affecting efficiency of the CHP district heating system are analyzed and recommendations made to improve the operating efficiency. The results show how thermodynamic analysis can be used to identify the magnitudes and location of energy losses in order to improve the existing system, processes or components.

**Exergy Analysis of Steam-injection Combined Cycle**

This title provides a reference on technical and economic factors of combined-cycle applications within the utility and cogeneration markets. Kehlhofer - and hos co-authors give the reader tips on system layout, details on controls and automation, and operating instructions.

**Challenges of Power Engineering and Environment**

This book comprises the select proceedings of the International Conference on Recent Trends in Developments of Thermofluids and Renewable Energy (TFRE 2020). The major topics covered include aerodynamics, alternate energy, bio fuel, bio heat transfer, computational fluid dynamics, control mechanism for constant power generation, and energy storage. The book also discusses latest developments in the fields of electric vehicles, hybrid power systems, and solar and renewable energy. Given the scope of its contents, this book will be useful for students, researchers, and professionals interested in the field of thermofluids and renewable energy resources.

**Thermodynamic Analysis of a Combined Cycle District Heating System**

This multi-disciplinary book presents the most recent advances in exergy, energy, and environmental issues. Volume 1 focuses on fundamentals in the field and covers current problems, future needs, and prospects in the area of energy and environment from researchers worldwide. Based on selected lectures from the Seventh International Exergy, Energy and Environmental Symposium (IEEES7-2015) and complemented by further invited contributions, this comprehensive set of contributions promote the exchange of new ideas and techniques...
in energy conversion and conservation in order to exchange best practices in "energetic efficiency". Included are fundamental and historical coverage of the green transportation and sustainable mobility sectors, especially regarding the development of sustainable technologies for thermal comforts and green transportation vehicles. Furthermore, contributions on renewable and sustainable energy sources, strategies for energy production, and the carbon-free society constitute an important part of this book. Exergy for Better Environment and Sustainability, Volume 1 will appeal to researchers, students, and professionals within engineering and the renewable energy fields.

**Modeling and Performance Enhancements of a Gas Turbine Combined Cycle Power Plant**

**Thermodynamics**

**Thermal Design and Optimization**

The main scope of this study is to emphasize exergy efficiency in all fields of industry. The chapters collected in the book are contributed by invited researchers with a long-standing experience in different research areas. I hope that the material presented here is understandable to a wide audience, not only energy engineers but also scientists from various disciplines. The book contains seven chapters in three sections: (1) "General Information about Exergy," (2) "Exergy Applications," and (3) "Thermoeconomic Analysis." This book provides detailed and up-to-date evaluations in different areas written by academics with experience in their fields. It is anticipated that this book will make a scientific contribution to exergy workers, researchers, academics, PhD students, and other scientists in both the present and the future.

**Gas Turbine Combined Cycle Power Plants**

"There is currently no comparable book available that covers both the history and future potential applications of closed-cycle gas turbines. This book is intended for design engineers and engineering managers in the worldwide gas turbine/power generation industry. Upper-level engineering students and schools of engineering would also benefit from this book, as it allows students to work and calculate different cycles and encourages them to make their own innovations."--Jacket.

**Advances in Thermofluids and Renewable Energy**

**Exergy**

A comprehensive and rigorous introduction to thermal system design from a contemporary perspective Thermal Design and Optimization offers readers a lucid introduction to the latest methodologies for the design of thermal systems andemphasizes engineering economics, system simulation, and optimization methods. The methods of exergy analysis, entropy generation minimization, and thermoeconomics are incorporated in an evolutionary manner. This book is one of the few sources available that addresses therecommendations of the Accreditation Board for Engineering andTechnology for new courses in design engineering. Intended forclassroom use as well as self-study, the text provides a review offundamental concepts, extensive reference lists, end-of-chapterproblem sets, helpful appendices, and a comprehensive case studythat is followed throughout the text. Contents include: * Introduction to Thermal System Design * Thermodynamics, Modeling, and Design Analysis * Exergy Analysis * Heat Transfer, Modeling, and Design Analysis * Applications with Heat and Fluid Flow * Applications with Thermodynamics and Heat and Fluid Flow * Economic Analysis * Thermoeconomic Analysis and Evaluation * Thermoeconomic Optimization Thermal Design and Optimization offers engineering students,practicing engineers, and technical managers a comprehensive andrigorous introduction to thermal system design and optimizationfrom a distinctly contemporary perspective. Unlike traditionalbooks that are largely oriented toward design analysis andcomponents, this forward-thinking book aligns itself with anincreasing number of active designers who believe that more effective, system-oriented design methods are needed. Thermal Design and Optimization offers a lucid presentation ofthermodynamics, heat transfer, and fluid mechanics as they areapplied to the design of thermal systems. This book broadens thescope of engineering design by placing a strong emphasis onengineering economics, system simulation, and optimizationtechniques. Opening with a concise review of fundamentals, itdevelops design methods within a framework of industrialapplications that gradually increase in complexity. Theseapplications include, among others, power generation by large andsmall systems, and cryogenic systems for the manufacturing,chemical, and food processing industries. This unique book draws on the best contemporary thinking aboutdesign and design methodology, including discussions of concurrentdesign and quality function deployment. Recent developments basedon the second law of thermodynamics are also included, especially the use of exergy analysis, entropy generation minimization, andthermoeconomics. To demonstrate the application of important designprinciples introduced, a single case study involving the design of a cogeneration system is followed throughout the book. In addition, Thermal Design and Optimization is one of the best new sources available for meeting the recommendations of the Accreditation Board for Engineering and Technology for more design emphasis in engineering curricula. Supported by extensive reference lists, end-of-chapter problem sets, and helpful appendices, this is a superb text for both the classroom and self-study, and for use in industrial design, development, and research. A detailed solutions manual is available from the publisher.
Exergy Analysis for Energy Conversion Systems

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.

Exergy, Energy System Analysis and Optimization - Volume I

In this study, efficiency analysis of combined cycle power plant which is working in Çigli/Izmir-Turkey for industrial zone for first and second laws of thermodynamics is realized. While analyzing of efficiency of combined power plant different environmental conditions and loads are observed and considered. The variations of the performance parameters and their magnitudes are studied. The useful power, reversible power and irreversibility are obtained for each component which constitutes the plant, and overall efficiencies of the plant are calculated. The results show the exergy analyses for a steam cycle system predict the plant efficiency more precisely. In addition to this, with this study, the efficiency of combined cycle power plant for second law of thermodynamic is showed and gives the attention on it

Potential for Industrial Energy-Efficiency Improvement in the Long Term

The exergy method makes it possible to detect and quantify the possibilities of improving thermal and chemical processes and systems. The introduction of the concept thermo-ecological cost (cumulative consumption of non-renewable natural exergy resources) generated large application possibilities of exergy in ecology. This book contains a short presentation on the basic principles of exergy analysis and discusses new achievements in the field over the last 15 years. One of the most important issues considered by the distinguished author is the economy of non-renewable natural exergy. Previously discussed only in scientific journals, other important new problems highlighted include: calculation of the chemical exergy of all the stable chemical elements, global natural and anthropogenic exergy losses, practical guidelines for improvement of the thermodynamic imperfection of thermal processes and systems, development of the determination methods of partial exergy losses in thermal systems, evaluation of the natural mineral capital of the Earth, and the application of exergy for the determination of a pro-ecological tax. A basic knowledge of thermodynamics is assumed, and the book is therefore most appropriate for graduate students and engineers working in the field of energy and ecological management.

Exergy

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).

Thermodynamics and the Destruction of Resources

Details energy and exergy efficiencies of all major aspects of bioenergy systems Covers all major bioenergy processes starting from photosynthesis and cultivation of biomass feedstocks and ending with final bioenergy products, like power, biofuels, and chemicals Each chapter includes historical developments, chemistry, major technologies, applications as well as energy, environmental and economic aspects in order to serve as an introduction to biomass and bioenergy A separate chapter introduces a beginner in easy accessible way to exergy analysis and the similarities and differences between energy and exergy efficiencies are underlined Includes case studies and illustrative examples of 1st, 2nd, and 3rd generation biofuels production, power and heat generation (thermal plants, fuel cells, boilers), and biorefineries Traditional fossil fuels-based technologies are also described in order to compare with the corresponding bioenergy systems

exergy analysis and optimum performance of combined cycle power plants

The Exergy Analysis and Optimization of Combined Gas Turbinesteam Turbine Cycle Power Plant
Deals with the availability method and its application to power plant system design and energy conversion. The first part of the book describes the development and the formulation of the availability method. The second part presents its applications to energy conversion processes. Examples for each energy conversion system are introduced and there are practice problems throughout the text.