

## Condenser Optimization In Steam Power Plant Springer

Thermal power plants are one of the most important process industries for engineering professionals. Over the past decades, the power sector is facing a number of critical issues; however, the most fundamental challenge is meeting the growing power demand in sustainable and efficient ways. Practicing power plant engineers not only look after operation and maintenance of the plant, but, also look after range of activities including research and development, starting from power generation to environmental aspects of power plants. The book *Thermal Power Plants - Advanced Applications* introduces analysis of plant performance, energy efficiency, combustion, heat transfer, renewable power generation, catalytic reduction of dissolved oxygen and environmental aspects of combustion residues. This book addresses issues related to both coal fired and steam power plants. The book is suitable for both undergraduate and research higher degree students, and of course for practicing power plant engineers.

Handbook of Applied Thermal Design CRC Press

*Geothermal Power Generation: Developments and Innovation* provides an update to the advanced energy technologies that are urgently required to meet the challenges of economic development, climate change mitigation, and energy security. As geothermal resources are considered renewable and can be used to generate baseload electricity while producing very low levels of greenhouse gas emissions, they can play a key role in future energy needs. This book, edited by a highly respected expert, provides a comprehensive overview of the major aspects of geothermal power production. The chapters, contributed by specialists in their respective areas, cover resource discovery, resource characterization, energy conversion systems, and design and economic considerations. The final section provides a range of fascinating case studies from across the world, ranging from Larderello to Indonesia. Users will find this to be an essential text for research and development professionals and engineers in the geothermal energy industry, as well as postgraduate researchers in academia who are working on geothermal energy.

Provides readers with a comprehensive and systematic overview of geothermal power generation Presents an update to the advanced energy technologies that are urgently required to meet the challenges of economic development, climate change mitigation, and energy security Edited by a world authority in the field, with chapters contributed by experts in their particular areas Includes comprehensive case studies from across the world, ranging from Larderello to Indonesia

The book discusses instrumentation and control in modern fossil fuel power plants, with an emphasis on selecting the most appropriate systems subject to constraints engineers have for their projects. It provides all the plant process and design details, including specification sheets and standards currently followed in the plant. Among the unique features of the book are the inclusion of control loop strategies and BMS/FSSS step by step logic, coverage of analytical instruments and technologies for pollution and energy savings, and coverage of the trends toward field bus systems and integration of subsystems into one network with the help of embedded controllers and OPC interfaces. The book includes comprehensive listings of operating values and ranges of parameters for temperature, pressure, flow, level, etc of a typical 250/500 MW thermal power plant. Appropriate for project engineers as well as instrumentation/control engineers, the book also includes tables, charts, and figures from real-life projects around the world. Covers systems in use in a wide range of power plants: conventional thermal power plants, combined/cogen plants, supercritical plants, and once through boilers Presents practical design aspects and current trends in instrumentation Discusses why and how to change control strategies when systems are updated/changed Provides instrumentation selection techniques based on operating parameters. Spec sheets are included for each type of instrument.

Consistent with current professional practice in North America, Europe, and India

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.

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.

*Sustainable Power Generation: Current Status, Future Challenges, and Perspectives* addresses emerging problems faced by the transition to sustainable electricity generation and combines perspectives of engineering and economics to provide a well-rounded overview. This book features an in-depth discussion of the main aspects of sustainable energy and the infrastructure of existing technologies. It goes on to evaluate natural resources that are sustainable and convenient forms of energy, and finishes with an investigation of the environmental effects of energy systems and power generating systems of the future. Other sections tackle fundamental topics such as thermal power, nuclear energy, bioenergy, hydropower, challenges and risks to sustainable options, and emerging technologies that support global power trends. *Sustainable Power Generation* explores the future of sustainable electricity generation, highlighting topics such as energy justice, emerging competences, and major transitions that need to be navigated. This is an ideal reference for researchers, engineers, and other technical specialists working in the energy sector, as well as environmental specialists and policy makers. Provides a multidisciplinary, structured approach to electricity generation, focusing on the key areas of technology, business, project management, and sustainability Includes analytics and discussions of sustainability metrics, underlying issues, and challenges Presents business cases, offering a mix of academic depth and practicality on energy options

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. Appendix F is a glossary of terms, and Appendix G contains the list of references. The text

is recommended for physicists who would like to know more about the Exergy Method, its underlying principles, and its applications not only in thermal plant analysis but also in certain areas.

Design and Performance Optimization of Renewable Energy Systems provides an integrated discussion of issues relating to renewable energy performance design and optimization using advanced thermodynamic analysis with modern methods to configure major renewable energy plant configurations (solar, geothermal, wind, hydro, PV). Vectors of performance enhancement reviewed include thermodynamics, heat transfer, exergoeconomics and neural network techniques. Source technologies studied range across geothermal power plants, hydroelectric power, solar power towers, linear concentrating PV, parabolic trough solar collectors, grid-tied hybrid solar PV/Fuel cell for freshwater production, and wind energy systems. Finally, nanofluids in renewable energy systems are reviewed and discussed from the heat transfer enhancement perspective. Reviews the fundamentals of thermodynamics and heat transfer concepts to help engineers overcome design challenges for performance maximization Explores advanced design and operating principles for solar, geothermal and wind energy systems with diagrams and examples Combines detailed mathematical modeling with relevant computational analyses, focusing on novel techniques such as artificial neural network analyses Demonstrates how to maximize overall system performance by achieving synergies in equipment and component efficiency

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.

The 29th European Symposium on Computer Aided Process Engineering, contains the papers presented at the 29th European Symposium of Computer Aided Process Engineering (ESCAPE) event held in Eindhoven, The Netherlands, from June 16-19, 2019. It is a valuable resource for chemical engineers, chemical process engineers, researchers in industry and academia, students, and consultants for chemical industries. Presents findings and discussions from the 29th European Symposium of Computer Aided Process Engineering (ESCAPE) event

This book presents recent research in the field of nonconventional and renewable energy, and energy efficiency in the context of thermal power. It addresses energy-efficiency and environmental issues that are critical in the production of thermal power, and also examines various applications, especially air conditioning, internal combustion engines, and solar electric power plants.

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.

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 CO<sub>2</sub> 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

An essential resource for optimizing energy systems to enhance design capability, performance and sustainability Optimization 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.

Good, No Highlights, No Markup, all pages are intact, Slight Shelfwear, may have the corners slightly dented, may have slight color changes/slightly damaged spine.

**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, thermoeconomic 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, exergoeconomic, artificial neural networks and multi-objective particle swarm Covers environmental impact considerations and integration with renewable energy systems

**Fundamentals and Applications of Supercritical Carbon Dioxide (SCO<sub>2</sub>) Based Power Cycles** aims to provide engineers and researchers with an authoritative overview of research and technology in this area. Part One introduces the technology and reviews the properties of SCO<sub>2</sub> relevant to power cycles. Other sections of the book address components for SCO<sub>2</sub> power cycles, such as turbomachinery expanders, compressors, recuperators, and design challenges, such as the need for high-temperature materials. Chapters on key applications, including waste heat, nuclear power, fossil energy, geothermal and concentrated solar power are also included. The final section addresses major international research programs. Readers will learn about the attractive features of SCO<sub>2</sub> power cycles, which include a lower capital cost potential than the traditional cycle, and the compounding performance benefits from a more efficient thermodynamic cycle on balance of plant requirements, fuel use, and emissions. Represents the first book to focus exclusively on SCO<sub>2</sub> power cycles Contains detailed coverage of cycle fundamentals, key components, and design challenges Addresses the wide range of applications of SCO<sub>2</sub> power cycles, from more efficient electricity generation, to ship propulsion

**The Handbook of Reliability, Maintenance, and System Safety through Mathematical Modeling** discusses the many factors that affect reliability and performance, including engineering design, materials, manufacturing, operations, maintenance, and many more. Reliability is one of the fundamental criteria in engineering systems design, with maintenance serving as a way to support reliability throughout a system's life. Addressing these issues requires information, modeling, analysis and testing. Different techniques are proposed and implemented to help readers analyze various behavior measures (in terms of the functioning and performance) of systems. Enables mathematicians to convert any process or system into a model that can be analyzed through a specific technique Examines reliability and mathematical modeling in a variety of disciplines, unlike competitors which typically examine only one Includes a table of contents with simple to complex examples, starting with basic models and then refining modeling approaches step-by-step

**Design of Thermal Energy Systems** Pradip Majumdar, Northern Illinois University, USA A comprehensive introduction to the design and analysis of thermal energy systems Design of Thermal Energy Systems covers the fundamentals and applications in thermal energy systems and components, including conventional power generation and cooling systems, renewable energy systems, heat recovery systems, heat sinks and thermal management. Practical examples are used throughout and are drawn from solar energy systems, fuel cell and battery thermal management, electrical and electronics cooling, engine exhaust heat and emissions, and manufacturing processes. Recent research topics such as steady and unsteady state simulation and optimization methods are also included. Key features: Provides a comprehensive introduction to the design and analysis of thermal energy systems, covering fundamentals and applications. Includes a wide range of industrial application problems and worked out example problems. Applies thermal analysis techniques to generate design specification and ratings. Demonstrates how to design thermal systems and components to meet engineering specifications. Considers alternative options and allows for the estimation of cost and feasibility of thermal systems. Accompanied by a website including software for design and analysis, a solutions manual, and presentation files with PowerPoint slides. The book is essential reading for: practicing engineers in energy and power industries; consulting engineers in mechanical, electrical and chemical engineering; and senior undergraduate and graduate engineering students.

**Comprehensive Energy Systems** provides a unified source of information covering the entire spectrum of energy, one of the most significant issues humanity has to face. This comprehensive book describes traditional and novel energy systems, from single generation to multi-generation, also covering theory and applications. In addition, it also presents high-level coverage on energy policies, strategies, environmental impacts and sustainable development. No other published work covers such breadth of topics in similar depth. High-level sections include Energy Fundamentals, Energy Materials, Energy Production, Energy Conversion, and Energy Management. Offers the most comprehensive resource available on the topic of energy systems Presents an authoritative resource authored and edited by leading experts in the field Consolidates information currently scattered in publications from different research fields (engineering as well as physics, chemistry, environmental sciences and economics), thus ensuring a common standard and language

**Advances in Steam Turbines for Modern Power Plants** provides an authoritative review of steam turbine design optimization, analysis and measurement, the development of steam turbine blades, and other critical components, including turbine retrofitting and steam turbines for renewable power plants. As a very large proportion of the world's electricity is currently generated in systems driven by steam turbines, (and will most likely remain the case in the future) with steam turbines operating in fossil-fuel, cogeneration, combined cycle, integrated gasification combined cycle, geothermal, solar thermal, and nuclear plants across the world, this book provides a comprehensive assessment of the research and work that has been completed over the past decades. Presents an in-depth review on steam turbine design optimization, analysis, and measurement Written by a range of experts in the area Provides an overview of turbine retrofitting and advanced applications in power generation

Now in its third edition, this single resource covers all aspects of the utilization of geothermal energy for power generation using fundamental scientific and engineering principles. 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. Important new chapters cover Hot Dry Rock, Enhanced Geothermal Systems, and Deep Hydrothermal Systems. New, international case studies provide practical, hands-on knowledge. Provides coverage of all aspects of the utilization of geothermal energy for power generation from fundamental scientific and engineering principles International case studies from real plants provide a unique compilation of hard-to-obtain data and experience Includes pivotal updates on advances in Hot Dry Rock, Enhanced Geothermal Systems, and Deep Hydrothermal Systems

**Thermal Power Plants: Modeling, Control, and Efficiency Improvement** explains how to solve highly complex industry problems regarding identification, control, and optimization through integrating conventional technologies, such as modern control technology, computational

intelligence-based multiobjective identification and optimization, distributed computing, and cloud computing with computational fluid dynamics (CFD) technology. Introducing innovative methods utilized in industrial applications, explored in scientific research, and taught at leading academic universities, this book: Discusses thermal power plant processes and process modeling, energy conservation, performance audits, efficiency improvement modeling, and efficiency optimization supported by high-performance computing integrated with cloud computing Shows how to simulate fossil fuel power plant real-time processes, including boiler, turbine, and generator systems Provides downloadable source codes for use in CORBA C++, MATLAB®, Simulink®, VisSim, Comsol, ANSYS, and ANSYS Fluent modeling software Although the projects in the text focus on industry automation in electrical power engineering, the methods can be applied in other industries, such as concrete and steel production for real-time process identification, control, and optimization.

The Handbook of Clean Energy Systems brings together an international team of experts to present a comprehensive overview of the latest research, developments and practical applications throughout all areas of clean energy systems. Consolidating information which is currently scattered across a wide variety of literature sources, the handbook covers a broad range of topics in this interdisciplinary research field including both fossil and renewable energy systems. The development of intelligent energy systems for efficient energy processes and mitigation technologies for the reduction of environmental pollutants is explored in depth, and environmental, social and economic impacts are also addressed. Topics covered include: Volume 1 - Renewable Energy: Biomass resources and biofuel production; Bioenergy Utilization; Solar Energy; Wind Energy; Geothermal Energy; Tidal Energy. Volume 2 - Clean Energy Conversion Technologies: Steam/Vapor Power Generation; Gas Turbines Power Generation; Reciprocating Engines; Fuel Cells; Cogeneration and Polygeneration. Volume 3 - Mitigation Technologies: Carbon Capture; Negative Emissions System; Carbon Transportation; Carbon Storage; Emission Mitigation Technologies; Efficiency Improvements and Waste Management; Waste to Energy. Volume 4 - Intelligent Energy Systems: Future Electricity Markets; Diagnostic and Control of Energy Systems; New Electric Transmission Systems; Smart Grid and Modern Electrical Systems; Energy Efficiency of Municipal Energy Systems; Energy Efficiency of Industrial Energy Systems; Consumer Behaviors; Load Control and Management; Electric Car and Hybrid Car; Energy Efficiency Improvement. Volume 5 - Energy Storage: Thermal Energy Storage; Chemical Storage; Mechanical Storage; Electrochemical Storage; Integrated Storage Systems. Volume 6 - Sustainability of Energy Systems: Sustainability Indicators, Evaluation Criteria, and Reporting; Regulation and Policy; Finance and Investment; Emission Trading; Modeling and Analysis of Energy Systems; Energy vs. Development; Low Carbon Economy; Energy Efficiencies and Emission Reduction. Key features: Comprising over 3,500 pages in 6 volumes, HCES presents a comprehensive overview of the latest research, developments and practical applications throughout all areas of clean energy systems, consolidating a wealth of information which is currently scattered across a wide variety of literature sources. In addition to renewable energy systems, HCES also covers processes for the efficient and clean conversion of traditional fuels such as coal, oil and gas, energy storage systems, mitigation technologies for the reduction of environmental pollutants, and the development of intelligent energy systems. Environmental, social and economic impacts of energy systems are also addressed in depth. Published in full colour throughout. Fully indexed with cross referencing within and between all six volumes. Edited by leading researchers from academia and industry who are internationally renowned and active in their respective fields. Published in print and online. The online version is a single publication (i.e. no updates), available for one-time purchase or through annual subscription.

This volume is a comprehensive presentation of analytical theory and real-world practical solutions. It clearly illustrates updated approaches that plant managers and performance engineers can use in judging condenser performance and in making maintenance decisions. The author examines current methods for modeling, diagnosing and improving condenser performance. He describes how to calculate heat transfer coefficients, provides details of the new ASME Power Test Code PTC 12.2-1998, and explains the significance of heat transfer coefficients in measuring the overall performance of an operating condenser. Further discussion includes condenser cleaning schedules that save money and reduce CO<sub>2</sub> emissions, diagnostic methods that help unit operators pinpoint problem areas, monitoring techniques that help predict the onset of tube fouling and deposit accumulation, and proper methods of tube plugging. New topic areas are also explored: assigning a dollar amount and excess carbon emissions to condenser fouling; methods for estimating cooling water flow rate; and performance analysis for multicompartment condensers. Contents Include: Basic Principles Condenser Performance Monitoring Condenser Performance Modeling Model of Turbine Low Pressure Stage and Estimation of Condenser Duty Interactive Model of Condenser and L.P. Turbine Stage Case Studies Optimization of Condenser Cleaning Schedules Condenser Maintenance Importance of Managed Condenser Maintenance Unit Operator Diagnostics Fouling, Corrosion and Water Contamination Mechanical Cleaning of Condenser Tubes On Site Air and Water in Leakage Detection/Eddy Current Testing Performance Monitoring of Power Plant Heat Exchangers.

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