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Comprehensive and unique source integrates the material usually distributed among a half a dozen sources. \* Presents a unified approach to modeling of new designs and develops the skills for complex engineering analysis. \* Provides industrial insight to the applications of the basic theory developed.

This accessible book presents unconventional technologies in heat exchanger design that have the capacity to provide solutions to major concerns within the process and power-generating industries. Demonstrating the advantages and limits of these innovative heat exchangers, it also discusses micro- and nanostructure surfaces and micro-scale equipment, and introduces pillow-plate, helical and expanded metal baffle concepts. It offers step-by-step worked examples, which provide instructions for developing an initial configuration and are supported by clear, detailed drawings and pictures. Various types of heat exchangers are available, and they are widely used in all fields of industry for cooling or heating purposes, including in combustion engines. The market in 2012 was estimated to be U\$ 42.7 billion and the global demand for heat exchangers is experiencing an annual growth of about 7.8 %. The market value is expected to reach U\$ 57.9 billion in 2016, and approach U\$ 78.16 billion in 2020. Providing a valuable introduction to students and researchers, this book offers clear and concise information to thermal engineers, mechanical engineers, process engineers and heat exchanger specialists.

Set III of this encyclopedia is a new addition to the previous Sets I and II. It contains 26 invited chapters from international specialists on the topics of numerical modeling of two-phase flows and evaporation, fundamentals of evaporation and condensation in microchannels and macrochannels, development and testing of micro two-phase cooling systems for electronics, and various special topics (surface wetting effects, microfin tubes, two-phase flow vibration across tube bundles). The chapters are written both by renowned university researchers and by well-known engineers from leading corporate research laboratories. Numerous 'must read' chapters cover the fundamentals of research and engineering practice on boiling, condensation and two-phase flows, two-phase heat transfer equipment, electronics cooling systems, case studies and so forth. Set III constitutes a 'must have' reference together with Sets I and II for thermal engineering researchers and practitioners.

Exim delivers electronic mail, both local and remote. It has all the virtues of a good postman: it's easy to talk to, reliable, efficient, and eager to accommodate even the most complex special requests. It's the default mail transport agent installed on some Linux systems, runs on many versions of Unix, and is suitable for any TCP/IP network with any combination of hosts and end-user mail software. Exim is growing in popularity because it is open source, scalable, and rich in features such as the following: Compatibility with the calling interfaces and options of Sendmail (for which Exim is usually a drop-in replacement) Lookups in LDAP servers, MySQL and PostgreSQL databases, and NIS or NIS+ services Support for many kinds of address parsing, including regular expressions that are compatible with Perl 5 Sophisticated error handling Innumerable tuning parameters for improving performance and handling enormous volumes of mail Best of all, Exim is easy to configure. You never have to deal with ruleset 3 or worry that a misplaced asterisk will cause an inadvertent mail bomb. While a basic configuration is easy to read and can be created quickly, Exim's syntax and behavior do get more subtle as you enter complicated areas like virtual hosting, filtering, and automatic replies. This book is a comprehensive survey that provides quick information for people in a hurry as well as thorough coverage of more advanced material.

This book presents the latest research in one of the most challenging, yet most universally applicable areas of technology. Multiphase flows are found in all areas of technology, at all length scales and flow regimes, involving compressible or incompressible linear or nonlinear fluids. The range of related problems of interest is vast, including astrophysics, biology, geophysics, atmospheric process, and many areas of engineering. The solution of the equations that describe such complex problems often requires a combination of advanced computational and experimental methods. For example, any models developed must be validated through the application of expensive and difficult experimental techniques. Numerous problems in the area thus remain as yet unsolved, including modelling nonlinear fluids, modelling and tracking interfaces, dealing with multiple length scales, characterising phase structures, and treating drop break-up and coalescence. The papers contained in the book were presented at the eighth in a well established series of biennial conferences that began in 2001. They represent close interaction between numerical modellers and other researchers working to gradually resolve the many outstanding issues in understanding of multiphase flow. The papers in the book cover such topics as: Multiphase Flow Simulation; Bubble and Drop Dynamics; Interface Behaviour; Experimental Measurements; Energy Applications; Compressible Flows; Flow in Porous Media; Turbulent Flow; Image Processing; Heat Transfer; Atomization; Hydromagnetics; Plasma; Fluidised Beds; Cavitation.

The aim of the two-set series is to present a very detailed and up-to-date reference for researchers and practicing engineers in the fields of mechanical, refrigeration, chemical, nuclear and electronics engineering on the important topic of two-phase heat transfer and two-phase flow. The scope of the first set of 4 volumes presents the fundamentals of the two-phase flows and heat transfer mechanisms, and describes in detail the most important prediction methods, while the scope of the second set of 4 volumes presents numerous special topics and numerous applications, also including numerical simulation methods. Practicing engineers will find extensive coverage to applications involving: multi-microchannel evaporator cold plates for

electronics cooling, boiling on enhanced tubes and tube bundles, flow pattern based methods for predicting boiling and condensation inside horizontal tubes, pressure drop methods for singularities (U-bends and contractions), boiling in multipoint tubes, and boiling and condensation in plate heat exchangers. All of these chapters include the latest methods for predicting not only local heat transfer coefficients but also pressure drops. Professors and students will find this 'Encyclopaedia of Two-Phase Heat Transfer and Flow' particularly exciting, as it contains authored books and thorough state-of-the-art reviews on many basic and special topics, such as numerical modeling of two-phase heat transfer and adiabatic bubbly and slug flows, the unified annular flow boiling model, flow pattern maps, condensation and boiling theories, new emerging topics, etc.

Provides a unique overview of energy management for the process industries Provides an overall approach to energy management and places the technical issues that drive energy efficiency in context Combines the perspectives of freewheeling consultants and corporate insiders In two sections, the book provides the organizational framework (Section 1) within which the technical aspects of energy management, described in Section 2, can be most effectively executed Includes success stories from three very different companies that have achieved excellence in their energy management efforts Covers energy management, including the role of the energy manager, designing and implementing energy management programs, energy benchmarking, reporting, and energy management systems Technical topics cover efficiency improvement opportunities in a wide range of utility systems and process equipment types, as well as techniques to improve process design and operation

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

This textbook provides engineers with the capability, tools and confidence to solve real-world heat transfer problems. It includes many advanced topics, such as Bessel functions, Laplace transforms, separation of variables, Duhamel's theorem and complex combination, as well as high order explicit and implicit numerical integration algorithms. These analytical and numerical solution methods are applied to topics not considered in most textbooks. Examples include heat exchangers involving fluids with varying specific heats or phase changes; heat exchangers in which axial conduction is a concern; and regenerators. Derivations of important results are presented completely, without skipping steps, which reduces student frustration and improves readability and retention. The examples are not trivial 'textbook' exercises; they are rather complex and timely real-world problems that are inherently interesting. This book integrates the computational software packages Maple, MATLAB®, FEHT and Engineering Equation Solver (EES) directly with the heat transfer material.

Amidst tightening requirements for eliminating CFC's, HCFC's, halons, and HFC's from use in air conditioning and heat pumps, the search began for replacements that are environmentally benign, non-flammable, and similar to the banned refrigerants in system-level behavior. Refrigerant mixtures are increasingly used as working fluids because they demo

Completely revised and updated to reflect current advances in heat exchanger technology, Heat Exchanger Design Handbook, Second Edition includes enhanced figures and thermal effectiveness charts, tables, new chapter, and additional topics--all while keeping the qualities that made the first edition a centerpiece of information for practicing engine

This book discusses conventional as well as unconventional wood drying technologies. It covers fundamental thermophysical and energetic aspects and integrates two complex thermodynamic systems, conventional kilns and heat pumps, aimed at improving the energy performance of dryers and the final quality of dried lumber. It discusses advanced components, kiln energy requirements, modeling, and software and emphasizes dryer/heat pump optimum coupling, control, and energy efficiency. Problems are included in most chapters as practical, numerical examples for process and system/components calculation and design. The book presents promising advancements and R&D challenges and future requirements.

Using a case study approach, this reference tests the reader's ability to apply engineering fundamentals to real-world examples and receive constructive feedback Case Studies in Mechanical Engineering provides real life examples of the application of engineering fundamentals. They relate to real equipment, real people and real decisions. They influence careers, projects, companies, and governments. The cases serve as supplements to funda-

mental courses in thermodynamics, fluid mechanics, heat transfer, instrumentation, economics, and statistics. The author explains equipment and concepts to solve the problems and suggests relevant assignments to augment the cases. Graduate engineers seeking to refresh their career, or acquire continuing education will find the studies challenging and rewarding. Each case is designed to be accomplished in one week, earning up to 15 hours of continuing education credit. Each case study provides methods to present an argument, work with clients, recommend action and develop new business. Key features: Highlights the economic consequences of engineering designs and decisions. Encourages problem solving skills. Application of fundamentals to life experiences. Ability to practice with real life examples. Case Studies in Mechanical Engineering is a valuable reference for mechanical engineering practitioners working in thermodynamics, fluid mechanics, heat transfer and related areas.

The imminent need to mitigate the global warming potential (GWP) and the impact of the ozone depletion potential (ODP) demand seeking more efficient uses of energy, new energy sources, and new technologies. Heat transfer plays a vital role in efficient power production with minimum investment, installation, and maintenance costs. This book deals with issues related to efficiently utilizing available energy by integrating the technology of heat exchangers into power production units. Further, it provides detailed descriptions of heat transfer applications commonly used in modern everyday life and industrial contexts, supported by practical and worked-out examples presented to facilitate learning.

This is a comprehensive survey of boiling heat transfer augmentation, one of the most dynamic areas in the field. The text covers fundamental aspects of boiling augmentation and provides an in-depth treatment of enhanced boiling surface applications in industry.

Microchannel Heat transfer is the cooling application of high power density microchips in the CPU system, micropower systems and many other large scale thermal systems requiring effective cooling capacity. This book offers the latest research and recommended models on the microsize cooling system which not only significantly reduces the weight load, but also enhances the capability to remove much greater amount of heat than any of large scale cooling systems. A detailed reference in microchannel phase change (boiling and condensation) including recommended models and correlations for various requirements such as pressure loss, and heat transfer coefficient. Researchers, engineers, designers and students will benefit from the collated, state-of-the-art of the research put together in this book and its systematic, addressing all the relevant issues and providing a good reference for solving problems of critical analysis. Up-to-date information will help delineate further research direction in the microchannel heat transfer The latest modeling information and recommendations will help in design method and purpose

Fractionators, separators and accumulators, cooling towers, gas treating, blending, troubleshooting field cases, gas solubility, and density of irregular solids \* Hundreds of common sense techniques, shortcuts, and calculations.

In recent years, the sustainability and safety of perishable foods has become a major consumer concern, and refrigeration systems play an important role in the processing, distribution, and storage of such foods. To improve the efficiency of food preservation technologies, it is necessary to explore new technological and scientific advances both in materials and processes. The Handbook of Research on Advances and Applications in Refrigeration Systems and Technologies gathers state-of-the-art research related to thermal performance and energy-efficiency. Covering a diverse array of subjects—from the challenges of surface-area frost-formation on evaporators to the carbon footprint of refrigerant chemicals—this publication provides a broad insight into the optimization of cold-supply chains and serves as an essential reference text for undergraduate students, practicing engineers, researchers, educators, and policymakers.

Aero engine bearing chambers are complex machine elements inside the engines, supporting up to three concentric shafts on bearings. For safety reasons, the aero engines always employ rolling-element type bearings and therefore require a sufficient oil supply for lubrication in order to guarantee a reliable operation. As a consequence, a complex two-phase flow consisting of oil and sealing air governs the bearing chambers. A highly dynamic oil film, flowing along the chamber walls, plays a vital role to fulfill the tasks of cooling, lubricating and cleaning the bearing chambers. The design and optimization process of the bearing chambers requires a detailed understanding in order to accurately simulate the film behaviour inside the bearing chambers. Based on the earlier experimental investigations, it is known that near the scavenge off-take a relatively thick film exists. The numerical model to simulate these films must therefore take into account the elliptical behaviour of such films. Among the different models, the Volume Of Fluid (VOF) Model offers the best compromise between accuracy and efforts. However, preliminary attempts to model a fully developed and turbulent test case from literature revealed an unphysical pressure drop and velocity profile in the gas phase above the film flow. An inadequate turbulence modelling near the gas-liquid interface was identified as the problem source. The 2-Equation turbulence models ( $k$ - $\epsilon$  &  $k$ - $\omega$ ) were extended to achieve a substantial improvement.

Understanding the physical properties and dynamical behavior of nanochannel flows has been of great interest in recent years and is important for the theoretical study of fluid dynamics and engineering applications in physics, chemistry, medicine, and electronics. The flows inside nanoscale pores are also important due to their highly beneficial drag and heat transfer properties. Nanoscale Flow: Advances, Modeling, and Applications presents the latest research in the multidisciplinary area of nanoscale flow. Featuring contributions from top inventors in industry, academia, and government, this comprehensive book: Highlights the current status of research on nucleate pool boiling heat transfer, flow boiling heat transfer, and critical heat flux (CHF) phenomena of nanofluids Describes two novel fractal models for pool boiling heat transfer of nanofluids, including subcooled pool boiling and nucleate pool boiling Explores thermal conductivity enhancement in nanofluids measured with a hot-wire calorimeter Discusses two-phase laminar mixed convection AL2O3-water nanofluid in an elliptic duct Explains the principles of molecular and omics imaging and spectroscopy techniques for cancer detection Analyzes fluid dynamics modeling of the tumor vasculature and drug transport Studies the properties of nanoscale particles and their impact on diagnosis, therapeutics, and theranostics Provides a brief background and review of medical nanoscale flow applications Contains useful appendices of physical constants, equations, common symbols, mathematical formulas, the periodic table, and more A valuable reference for engineers, scientists, and biologists, Nanoscale Flow: Advances, Modeling, and Applications is also designed for researchers, universities, industrial institutions, and government, giving it broad appeal.

This book deals with issues related to the efficient utilization of available energy in industrial sites. It also provides a recipe for minimizing the Global Warming Potential (GWP) and reducing the impact of Ozone Depletion Potential (ODP) on nature, and presents a variety of insights into thermodynam-

ics, heat transfer, and energy management for teaching purposes. The book will assist beginner and senior engineers to deal with energy issues from a more global perspective.

\* Third edition of a well-known and well established text both in industry and for teaching \* Fully up-to-date and includes extra problems This book is an aid to heat exchanger design written primarily for design and development engineers in the chemical process, power generation, and refrigeration industries. It provides a comprehensive reference on two-phase flows, boiling, and condensation. The text covers all the latest advances like flows over tube bundles and two-phase heat transfer regarding refrigerants and petrochemicals. Another feature of this third edition is many new problems at chapter ends to enhance its use as a teaching text for graduate and post-graduate courses on two-phase flow and heat transfer. - ;This book is written for practising engineers as a comprehensive reference on two-phase flows, boiling, and condensation. It deals with methods for estimating two-phase flow pressure drops and heat transfer rates. It is a well-known reference book in its third edition and is also used as a text for advanced university courses. Both authors write from practical experience as both are professional engineers. -

Jeff Speck has dedicated his career to determining what makes cities thrive. And he has boiled it down to one key factor: walkability. The very idea of a modern metropolis evokes visions of bustling sidewalks, vital mass transit, and a vibrant, pedestrian-friendly urban core. But in the typical American city, the car is still king, and downtown is a place that's easy to drive to but often not worth arriving at. Making walkability happen is relatively easy and cheap; seeing exactly what needs to be done is the trick. In this essential new book, Speck reveals the invisible workings of the city, how simple decisions have cascading effects, and how we can all make the right choices for our communities. Bursting with sharp observations and real-world examples, giving key insight into what urban planners actually do and how places can and do change, Walkable City lays out a practical, necessary, and eminently achievable vision of how to make our normal American cities great again.

Providing a comprehensive introduction to the fundamentals and applications of flow and heat transfer in conventional and miniature systems, this fully enhanced and updated edition covers all the topics essential for graduate courses on two-phase flow, boiling, and condensation. Beginning with a concise review of single-phase flow fundamentals and interfacial phenomena, detailed and clear discussion is provided on a range of topics, including two-phase hydrodynamics and flow regimes, mathematical modeling of gas-liquid two-phase flows, pool and flow boiling, flow and boiling in mini and microchannels, external and internal-flow condensation with and without noncondensables, condensation in small flow passages, and two-phase choked flow. Numerous solved examples and end-of-chapter problems that include many common design problems likely to be encountered by students, make this an essential text for graduate students. With up-to-date detail on the most recent research trends and practical applications, it is also an ideal reference for professionals and researchers in mechanical, nuclear, and chemical engineering.

This book compiles the latest research, development, and application of VRF systems with contributions from various experts who pioneered and contributed to the development of the VRF system. This book presents the fundamental issues related to the real application and behaviour of the VRF system based on the long-term monitoring of the installed system. With our experience of pandemic which COVID-19 is an airborne, the spread of the virus is very fast. With this, the heating, ventilating and air-conditioning (HVAC) system is a major player in the maintenance and control of indoor environment to minimize the spread of the virus. As the variable refrigerant flow (VRF) system is a versatile HVAC system in which it can operate at different conditions, the application of the VRF system is very important to control the indoor environmental conditions. Thus, the publication of this book is important with the present situation and the future possible situation which the control of indoor spaces is very important. With this, this book will serve as a reference for building designer, contractors, building regulators and students.

Process Heat Transfer is a reference on the design and implementation of industrial heat exchangers. It provides the background needed to understand and master the commercial software packages used by professional engineers in the design and analysis of heat exchangers. This book focuses on types of heat exchangers most widely used by industry: shell-and-tube exchangers (including condensers, reboilers and vaporizers), air-cooled heat exchangers and double-pipe (hairpin) exchangers. It provides a substantial introduction to the design of heat exchanger networks using pinch technology, the most efficient strategy used to achieve optimal recovery of heat in industrial processes. Utilizes leading commercial software. Get expert HTRI Xchanger Suite guidance, tips and tricks previously available via high cost professional training sessions. Details the development of initial configuration for a heat exchanger and how to systematically modify it to obtain an efficient final design. Abundant case studies and rules of thumb, along with copious software examples, provide a complete library of reference designs and heuristics for readers to base their own designs on.

Transport phenomena are the physical forces and processes by which energy and mass are moved into, out of, and throughout a system. Systems that are changing from one state (phase) to another, such as liquid to gas, are said to be "multiphase." This advanced text, for the first time, teaches the fundamentals of transport phenomena, including the relevant thermodynamics and kinetics, in the context of multiphase systems. Students will find this an accessible guide to the understanding of an often dauntingly complex subject, with ample worked-out examples taken from real-life engineering problems and helpful end-of-chapter problems to help reinforce abstract concepts. \*Develops and understanding of the thermal and physical behavior of multiphase systems \*Reviews underlying thermodynamics, including thermal equilibria and stability, thermodynamics of surfaces \*Covers all types of phase changes, including melting and solidification, sublimation and vapor deposition, boiling, condensation, and evaporation \*Ample end-of-chapter problems \*Solutions Manual

Since its first volume in 1960, Advances in Computers has presented detailed coverage of innovations in computer hardware, software, theory, design, and applications. It has also provided contributors with a medium in which they can explore their subjects in greater depth and breadth than journal articles usually allow. As a result, many articles have become standard references that continue to be of significant, lasting value in this rapidly expanding field. In-depth surveys and tutorials on new computer technology Well-known authors and researchers in the field Extensive bibliographies with most chapters Many of the volumes are devoted to single themes or subfields of computer science

This book covers aspects of multiphase flow and heat transfer during phase change processes, focusing on boiling and condensation in microscale channels. The authors present up-to-date predictive methods for flow pattern, void fraction, pressure drop, heat transfer coefficient and critical heat flux, pointing out the range of operational conditions that each method is valid. The first four chapters are dedicated on the motivation to study multi-



phase flow and heat transfer during phase change process, and the three last chapters are focused on the analysis of heat transfer process during boiling and condensation. During the description of the models and predictive methods, the trends are discussed and compared with experimental findings.

The aim of the two-set series is to present a very detailed and up-to-date reference for researchers and practicing engineers in the fields of mechanical, refrigeration, chemical, nuclear and electronics engineering on the important topic of two-phase heat transfer and two-phase flow. The scope of the first set of 4 volumes presents the fundamentals of the two-phase flows and heat transfer mechanisms, and describes in detail the most important prediction methods, while the scope of the second set of 4 volumes presents numerous special topics and numerous applications, also including numerical simulation methods. Practicing engineers will find extensive coverage to applications involving: multi-microchannel evaporator cold plates for electronics cooling, boiling on enhanced tubes and tube bundles, flow pattern based methods for predicting boiling and condensation inside horizontal tubes, pressure drop methods for singularities (U-bends and contractions), boiling in multiport tubes, and boiling and condensation in plate heat exchangers. All of these chapters include the latest methods for predicting not only local heat transfer coefficients but also pressure drops. Professors and students will find this 'Encyclopedia of Two-Phase Heat Transfer and Flow' particularly exciting, as it contains authored books and thorough state-of-the-art reviews on many basic and special topics, such as numerical modeling of two-phase heat transfer and adiabatic bubbly and slug flows, the unified annular flow boiling model, flow pattern maps, condensation and boiling theories, new emerging topics, etc.

Food Processing Technology: Principles and Practice, Fourth Edition, has been updated and extended to include the many developments that have taken place since the third edition was published. The new edition includes an overview of the component subjects in food science and technology, processing stages, important aspects of food industry management not otherwise considered (e.g. financial management, marketing, food laws and food industry regulation), value chains, the global food industry, and over-arching considerations (e.g. environmental issues and sustainability). In addition, there are new chapters on industrial cooking, heat removal, storage, and distribution, along with updates on all the remaining chapters. This updated edition consolidates the position of this foundational book as the best single-volume introduction to food manufacturing technologies available, remaining as the most adopted standard text for many food science and technology courses. Updated edition completely revised with new developments on all the processing stages and aspects of food industry management not otherwise considered (e.g. financial management, marketing, food

laws, and food industry regulation), and more. Introduces a range of processing techniques that are used in food manufacturing. Explains the key principles of each process, including the equipment used and the effects of processing on micro-organisms that contaminate foods. Describes post-processing operations, including packaging and distribution logistics. Includes extra textbook elements, such as videos and calculations slides, in addition to summaries of key points in each chapter.

Spatial Capture-Recapture provides a comprehensive how-to manual with detailed examples of spatial capture-recapture models based on current technology and knowledge. Spatial Capture-Recapture provides you with an extensive step-by-step analysis of many data sets using different software implementations. The authors' approach is practical - it embraces Bayesian and classical inference strategies to give the reader different options to get the job done. In addition, Spatial Capture-Recapture provides data sets, sample code and computing scripts in an R package. Comprehensive reference on revolutionary new methods in ecology makes this the first and only book on the topic. Every methodological element has a detailed worked example with a code template, allowing you to learn by example. Includes an R package that contains all computer code and data sets on companion website.

Indeed, today "second generation" enhancement concepts are routing in the automotive and refrigeration industries to obtain lower cost, smaller heat exchanger size, and higher energy efficiency in system operation. And the aerospace, process, and power generation industries are not far behind.

The Vol. 5 of this Book Series contains 22 chapters written by 79 contributors-experts from universities, research centres and industry from 15 countries: Australia, Canada, China, France, Germany, Italy, Malaysia, Mexico, Poland, Portugal, Russia, Slovenia, Spain, Ukraine and USA. This volume contains information at the cutting edge of sensor research and related topics from the following three areas: Physical Sensors, Sensor Networks and Remote Sensing. Coverage includes current developments in various sensors, sensor instrumentation and applications. In order to offer a fast and easy reading of each topic, every chapter in this volume is independent and self-contained. With the unique combination of information in this volume, the 'Advances in Sensors: Reviews' Book Series will be of value for scientists and engineers in industry and at universities, to sensors developers, distributors, and end users.