Air Dispersion Modeling Foundations And Applications

A 25-year tradition of excellence is extended in the Fourth Edition of this highly regarded text. In clear, authoritative language, the authors discuss the philosophy and procedures for the design of air pollution control systems. Their objective is twofold: to present detailed information on air pollution and its control, and to provide formal design training for engineering students. New to this edition is a comprehensive chapter on carbon dioxide control, perhaps the most critical emerging issue in the field. Emphasis is on methods to reduce carbon dioxide emissions and the technologies for carbon capture and sequestration. An expanded discussion of control technologies for coal-fired power plants includes details on the capture of NOx and mercury emissions. All chapters have been revised to reflect the most recent information on U.S. air quality trends and standards. Moreover, where available, equations for equipment cost estimation have been updated to the present time. Abundant illustrations clarify the concepts presented, while numerous examples and end-of-chapter problems reinforce the design principles and provide opportunities for students to enhance their problem-solving skills. Biologically-inspired data mining has a wide variety of applications in areas such as data clustering, classification, sequential pattern mining, and information extraction in healthcare and bioinformatics. Over the past decade, research materials in this area have dramatically increased, providing clear evidence of the popularity of these techniques. Biologically-Inspired Techniques for Knowledge Discovery and Data Mining exemplifies prestigious research and shares the practices that have allowed these areas to grow and flourish. This essential reference publication highlights contemporary findings in the area of biologically-inspired techniques in data mining domains and their implementation in real-life problems. Providing quality work from established researchers, this publication serves to extend existing knowledge within the research communities of data mining and knowledge discovery, as well as for academicians and students in the field.

Chemical Engineering Kinetics and Reactor Design is one of the key courses in any academic Chemical Engineering studies, and it is typically offered in the third year of a Chemical Engineering undergraduate program. The main objective of this course is to learn to analyze the performance of chemical reactors, and to design them. This book covers all topics that are taught in an undergraduate course on Chemical Engineering Kinetics and Reactor Design. Starting from the study of chemical kinetics of homogeneous, noncatalytic systems, the book moves on to heterogeneous catalytic kinetics, enzymatic kinetics, and other complex systems. Armed with this knowledge, the student is taught how to describe batch reactors, continuous stirred-tank reactors, and plug-flow reactors. The book is concluded with a chapter on the determination of reaction kinetics from experimental data, and a chapter introducing advanced reactor design. While analytical solutions to reactor problems are discussed whenever they are relevant, the main focus is on numerical reactor models. All models are freely available either as Matlab code, or as an Excel file, on the series website that can be found at http://www.lecturenotesonline.com

This contributed volume is primarily intended for graduate and professional audiences. The book provides a basic understanding of urban air quality issues, root causes for local and urban air pollution, monitoring and modelling techniques, assessment, and control options to manage air quality at local and urban scale. The book also offers useful information on indoor air quality and smart sensors, which are gaining much importance in current times.

This book discusses topics in mission-oriented sensor networks and systems research and practice, enabling readers to understand the major technical and application challenges of these networks, with respect to their architectures, protocols, algorithms, and application

design. It also presents novel theoretical and practical ideas, which have led to the development of solid foundations for the design, analysis, and implementation of energy-efficient, reliable, and secure mission-oriented sensor network applications. Covering various topics, including sensor node architecture, sensor deployment, mobile coverage, mission assignment, detection, localization, tracking, data dissemination, data fusion, topology control, geometric routing, location privacy, secure communication, and cryptograph, it is a valuable resource for computer scientists, researchers, and practitioners in academia and industry. Planners and lawyers engaged in the formulation and implementation of plans affecting the environment should have a working knowledge of the legal principles affecting those plans. They should also be familiar with the principles of environmental law. However, environmental law has not been a traditional part of the curriculum of law schools. Many practicing lawyers have never taken a course in environmental law; nor have many of the judges charged with deciding cases whose outcome may have consequences for the environment. In the interest of counteracting this lack of knowledge, Legal Foundations of Environmental Planning integrates excerpts from more than seventy-five court case rulings to illustrate the system of environmental laws and the problems of enforcement. Dedicated specifically to discussions on legal theories and procedures, air pollution, water pollution, and control of population growth and distribution, this sourcebook also includes an extensive glossary of environmental terms. It is a valuable aid for students, legal specialists, public officials, environmental professionals, and urban planners.

This book presents an in-depth, science-based approach to applying key project-management and spatial tools and practices in environmental projects. Providing important data for those considering projects that balance social-economic growth against minimizing its ill-effects on planet Earth, the book discusses various aspects of environmental engineering, as well as formula and analytical approaches required for more informed decision-making. Beginning with a broad overview of the factors and features of environmental processes and management, the book then clearly details the general application of fundamental processes, the characteristics of the different systems in which they occur, and the way in which these factors influence process dynamics, environmental systems, and their possible remedies. While primarily intended for professionals responsible for the management of environmental projects or interested in improving the overall efficiency of such projects, it is also useful for managers in the private, public, and not-for-profit sectors. Further, it is a valuable resource for students at both undergraduate and postgraduate levels, and an indispensable guide for anyone wanting to develop their skills in modern environmental management and related techniques.

"Wind storms impact human lives, their built as well as natural habitat. During the last century, society's vulnerability to wind storms has been reduced by enhanced knowledge of their impact and by controlling exposure through better design. However, only two of the wind systems have so far been considered in the design of buildings and structures, i.e., synoptic winds resulting from macroscale

weather systems spanning thousands of kilometers, e.g., extratropical storms, and mesoscale tropical storms spanning hundreds of kilometers and traveling fast, e.g., hurricanes/typhoons/cyclones. During the last two decades, enough evidence has surfaced to support that a third type of very localized wind storms, the non-synoptic winds, are the most damaging in some regions of the world. Thus far there are no design provisions established for the codification of these wind storms. Their characterization in terms of climatology, wind field and intensity, frequency and occurrence, as well as their impact on the built environment, is slowly developing. This handbook presents the state-of-the-art of knowledge related to all these features including their risk, insurance issues, and economics. The research in this area is on the one hand more arduous given the reduced scale, the three-dimensionality, and nonstationary aspects of these non-synoptic winds while, at the same time, its understanding and modeling are being aided by the emergence of novel modeling and simulation techniques which are addressed in this handbook. This will serve as a guiding resource for those interested in learning about and contributing to the advancement of the field"--
A single reference to all aspects of contemporary air dispersion modeling The practice of air dispersion modeling has changed dramatically in recent years, in large part due to new EPA regulations. Current with the EPA's 40 CFR Part 51, this book serves as a complete reference to both the science and contemporary practice of air dispersion modeling. Throughout the book, author Alex De Visscher guides readers through complex calculations, equation by equation, helping them understand precisely how air dispersion models work, including such popular models as the EPA's AERMOD and CALPUFF. Air Dispersion Modeling begins with a primer that enables readers to quickly grasp basic principles by developing their own air dispersion model. Next, the book offers everything readers need to work with air dispersion models and accurately interpret their results, including: Full chapter dedicated to the meteorological basis of air dispersion Examples throughout the book illustrating how theory translates into practice Extensive discussions of Gaussian, Lagrangian, and Eulerian air dispersion modeling Detailed descriptions of the AERMOD and CALPUFF model formulations This book also includes access to a website with Microsoft Excel and MATLAB files that contain examples of air dispersion model calculations. Readers can work with these examples to perform their own calculations. With its comprehensive and up-to-date coverage, Air Dispersion Modeling is recommended for environmental engineers and meteorologists who need to perform and evaluate environmental impact assessments. The book's many examples and step-by-step instructions also make it ideal as a textbook for students in the fields of environmental engineering, meteorology, chemical engineering, and environmental sciences.
A much-needed, up-to-date guide on conventional and alternative power generation This book goes beyond the traditional methods of power generation. It introduces the many recent innovations on the production of electricity and the

way they play a major role in combating global warming and improving the efficiency of generation. It contains a strong analytical approach to underpin the theory of power plants—for those using conventional fuels, as well as those using renewable fuels—and looks at the problems from a unique environmental engineering perspective. The book also includes numerous worked examples and case studies to demonstrate the working principles of these systems. Conventional and Alternative Power Generation: Thermodynamics, Mitigation and Sustainability is divided into 8 chapters that comprehensively cover: thermodynamic systems; vapor power cycles, gas power cycles, combustion; control of particulates; carbon capture and storage; air pollution dispersal; and renewable energy and power plants. Features an abundance of worked examples and tutorials Examines the problems of generating power from an environmental engineering perspective Includes all of the latest information, technology, theories, and principles on power generation Conventional and Alternative Power Generation: Thermodynamics, Mitigation and Sustainability is an ideal text for courses on mechanical, chemical, and electrical engineering.

This book is an authoritative collection of contributions in the field of soft-computing. Based on selected works presented at the 6th World Conference on Soft Computing, held on May 22-25, 2016, in Berkeley, USA, it describes new theoretical advances, as well as cutting-edge methods and applications. Theories cover a wealth of topics, such as fuzzy logic, cognitive modeling, Bayesian and probabilistic methods, multi-criteria decision making, utility theory, approximate reasoning, human-centric computing and many others. Applications concerns a number of fields, such as internet and semantic web, social networks and trust, control and robotics, computer vision, medicine and bioinformatics, as well as finance, security and e-Commerce, among others. Dedicated to the 50th Anniversary of Fuzzy Logic and to the 95th Birthday Anniversary of Lotfi A. Zadeh, the book not only offers a timely view on the field, yet it also discusses thought-provoking developments and challenges, thus fostering new research directions in the diverse areas of soft computing.

Investigations of atmospheric pollution have recently reached a new stage. In addition to the estimation and the monitoring of pollutant concentrations in the air around their sources, by way of observational data and also by calcu lations on the basis of theoretical research, it is now possible to make short term forecasts of air pollution and to use them to regulate industrial emissions. Many countries are interested in such forecasts. In the Soviet Union the organizations of the State Committee of the USSR for Hydrometeorology (Goskomgidromet) are carrying out a wide-scale scientific programme on the devising of methods to forecast atmospheric pollution. Prognostic groups are organized in territorial hydrometeocenters; in essence a new forecasting service has been established. Nowadays, in more than 200 towns of the USSR predictions are made and transmitted to large enterprises for the purpose of taking the necessary steps to preserve air qua lity. To ensure an operative working of this service, Methodological Instruc (1979) have been issued, as well as other instructions and guides. Wide tions scale verifications of proposed calculating methods have been made. Prob lems of forecasting and regulating air pollution have become evident lately in other countries as well. Much attention to these problems is payed by the World Meteorological Organization (WMO). They have been widely dis cussed in a number of international conferences and meetings for modelling and investigating pollutant distribution in the atmosphere. The number of publications on this subject is rapidly increasing.

In light of the expensive nature of quantitative research, such as experiments, researchers

must seek other methods of understanding the world around them. As such, new qualitative methods are gaining ground in the modern research community. Enhancing Qualitative and Mixed Methods Research with Technology explores the integration of new digital tools into the research process. Including current information on data visualization, research design, information capture, as well as social media analysis, this publication serves as an ideal reference source for academicians, scientists, information specialists, business managers, and upper-level students involved in interdisciplinary research.

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This textbook discusses engineering principles relating to air pollution and greenhouse gases (GHGs); it focuses on engineering principles and designs of related devices and equipment for air emission control for a variety of industries such as energy, chemical, and transportation industries. The book aims primarily at senior undergraduate and graduate students in mechanical, chemical and/or environmental engineering departments; it can also be used as a reference book by technical staff and design engineers who are interested in and need to have technical knowledge in air pollution and GHGs. The book is motivated by recent rapid advances in air pollution and greenhouse gas emissions and their control technologies. In addition to classic topics related to air pollution, this book is also featured with emerging topics related to air pollution and GHGs. It covers recent advances in engineering approaches to the reduction of GHG emissions including, but are not limited to, green energy technologies and carbon sequestration and storage. It also introduces an emerging topic in air pollution, which is referred to as Nano Air Pollution. It is a growing concern in air pollution, but largely missing in similar books, likely because of recent rapid advances in nanotechnology has outpaced the advances in nano air pollution control.

Current developments in air pollution modelling are explored as a series of contributions from researchers at the forefront of their field. This newest contribution on air pollution modelling and its application is focused on local, urban, regional and intercontinental modelling; long term modelling and trend analysis; data assimilation and air quality forecasting; model assessment and evaluation; aerosol transformation. Additionally, this work also examines the relationship between air quality and human health and the effects of climate change on air quality. This Work is a collection of selected papers presented at the 35th International Technical Meeting on Air Pollution Modeling and its Application, held in Chania (Crete), Greece, Oct 3-7, 2016. The book is intended as reference material for students and professors interested in air pollution modelling at the graduate level as well as researchers and professionals involved in developing and utilizing air pollution models.

This Festschrift volume, published in honor of John Mylopoulos on the occasion of his retirement from the University of Toronto, contains 25 high-quality papers, written by leading scientists in the field of conceptual modeling. The volume has been divided into six sections. The first section focuses on the foundations of conceptual modeling and contains material on ontologies and knowledge representation. The four sections on software and requirements engineering, information systems, information integration, and web and services, represent the chief current application domains of conceptual modeling. Finally, the section on implementations concentrates on projects that build tools to support conceptual modeling. With its in-depth coverage of diverse topics, this book could be a useful companion to a course on conceptual modeling.

Based on his 40+ years of research and teaching, John Wyngaard's textbook is an excellent up-to-date introduction to turbulence in the atmosphere and in engineering flows for advanced students, and a reference work for researchers in the atmospheric sciences. Part I introduces the concepts and equations of turbulence. It includes a rigorous introduction to the principal types of numerical modeling of turbulent flows. Part II describes turbulence in the atmospheric boundary layer. Part III covers the foundations of the statistical representation of turbulence

and includes illustrative examples of stochastic problems that can be solved analytically. The book treats atmospheric and engineering turbulence in a unified way, gives clear explanation of the fundamental concepts of modeling turbulence, and has an up-to-date treatment of turbulence in the atmospheric boundary layer. Student exercises are included at the ends of chapters, and worked solutions are available online for use by course instructors.

For decades, optimization methods such as Fuzzy Logic, Artificial Neural Networks, Firefly, Simulated annealing, and Tabu search, have been capable of handling and tackling a wide range of real-world application problems in society and nature. Analysts have turned to these problem-solving techniques in the event during natural disasters and chaotic systems research. The Handbook of Research on Artificial Intelligence Techniques and Algorithms highlights the cutting edge developments in this promising research area. This premier reference work applies Meta-heuristics Optimization (MO) Techniques to real world problems in a variety of fields including business, logistics, computer science, engineering, and government. This work is particularly relevant to researchers, scientists, decision-makers, managers, and practitioners.

Fundamentals of Air Pollution is an important and widely used textbook in the environmental science and engineering community. This thoroughly revised fifth edition of Fundamentals of Air Pollution has been updated throughout and remains the most complete text available, offering a stronger systems perspective and more coverage of international issues relating to air pollution. Sections on pollution control have been reorganized and updated to demonstrate the move from regulation and control approaches to green and sustainable engineering approaches. The fifth edition maintains a strong interdisciplinary approach to the study of air pollution, covering such topics as chemistry, physics, meteorology, engineering, toxicology, policy, and regulation. New material includes near-road air pollution, new risk assessment approaches, indoor air quality, the impact of biofuels and fuel additives, mercury emissions, forecasting techniques, and the most recent results from the National Air Toxics Assessment. Stronger systems approach, emphasizing the impact of air pollution on ecosystems and human health Risks, measures, models, and control of air pollution are discussed at scale – starting at the individual/niche level and expanding to planetary/global scale Increased emphasis on international issues, including coverage of European initiatives and discussions of the impact of emerging economies like India and China Updated references, standards, and methods throughout the book make this the most current air pollution text/reference on the market All new end-of-chapter problems enhance its usefulness as a course text

Meteorology has made significant strides in recent years due to the development of new technologies. With the aid of the latest instruments, the analysis of atmospheric data can be optimized. Computational Techniques for Modeling Atmospheric Processes is an academic reference source that encompasses novel methods for the collection and study of meteorological data. Including a range of perspectives on pertinent topics such as air pollution, parameterization, and thermodynamics, this book is an ideal publication for researchers, academics, practitioners, and students interested in instrumental methods in the study of atmospheric processes.

As technology continues to become more sophisticated, mimicking natural processes and phenomena also becomes more of a reality. Continued research in the field of natural computing enables an understanding of the world around us, in addition to opportunities for man-made computing to mirror the natural processes and systems that have existed for centuries. Nature-Inspired Computing: Concepts, Methodologies, Tools, and Applications takes an interdisciplinary approach to the topic of natural computing, including emerging technologies being developed for the purpose of simulating natural phenomena, applications across industries, and the future outlook of biologically and nature-inspired technologies. Emphasizing critical research in a comprehensive multi-volume set, this publication is designed

for use by IT professionals, researchers, and graduate students studying intelligent computing. Once pollutants are released into the atmosphere, they cannot be removed easily nor can the reaction with atmospheric constituents be ceased. However, through enhancing our understanding of control technology, further addition of pollution can be forestalled. Through better understanding of innovations in the field of air pollutant control technology and modelling, better cost-effective control equipment can be designed to achieve a clean biosphere for sustainable life in the near future. Global Perspectives on Air Pollution Prevention and Control System Design is a pivotal reference source that provides vital research on the understanding of the basic concepts of air pollution, modeling concepts, development of various models for source-specific pollutants, and dispersion. While highlighting topics such as climate change, fossil fuels, and motor vehicle emissions, this publication explores the links between the global impact on climate change and modeling concepts of indoor air pollutants. This book is ideally designed for professors, students, researchers, environmental agencies, environmentalists, policymakers, and government officials, seeking current research on future solutions in critical fields of air pollution.

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