

A Stochastic Approach For Predicting The Profitability Of

Atomization and sprays are used in a wide range of industries: mechanical, chemical, aerospace, and civil engineering; material science and metallurgy; food; pharmaceutical, forestry, environmental protection; medicine; agriculture; meteorology and others. Some specific applications are spray combustion in furnaces, gas turbines and rockets, spray drying and cooling, air conditioning, powdered metallurgy, spray painting and coating, inhalation therapy, and many others. The Handbook of Atomization and Sprays will bring together the fundamental and applied material from all fields into one comprehensive source. Subject areas included in the reference are droplets, theoretical models and numerical simulations, phase Doppler particle analysis, applications, devices and more.

Handbook of Materials Failure Analysis: With Case Studies from the Oil and Gas Industry provides an updated understanding on why materials fail in specific situations, a vital element in developing and engineering new alternatives. This handbook covers analysis of materials failure in the oil and gas industry, where a single failed pipe can result in devastating consequences for people, wildlife, the environment, and the economy of a region. The book combines introductory sections on failure analysis with numerous real world case studies of pipelines and other types of materials failure in the oil and gas industry, including joint failure, leakage in crude oil storage tanks, failure of glass fibre reinforced epoxy pipes, and failure of stainless steel components in offshore platforms, amongst others. Introduces readers to modern analytical techniques in materials failure analysis Combines foundational knowledge with current research on the latest developments and innovations in the field Includes numerous compelling case studies of materials failure in oil and gas pipelines and drilling platforms

Edited by Jussi Kantola, the founding faculty member of the world's first university Knowledge Service Engineering Department at Korea Advanced Institute of Science and Technology, and Waldemar Karwowski from the Department of Industrial Engineering and Management Systems at UCF, Knowledge Service Engineering Handbook defines what knowledge services engineering means and how it is different from service engineering and service production. This groundbreaking handbook explores recent advances in knowledge service engineering from the accomplished researchers and practitioners in this field from around the world and provides engineering, systemic, industry, and consumer use viewpoints to knowledge service systems and engineering paradigms. The handbook outlines how to acquire and utilize knowledge in the 21st century presenting multiple cultural aspects including US, European, and Asian perspectives. Organized into four parts, it begins with an introduction to the main concepts of knowledge services. It then explores data, information and knowledge based engineering methods and applications that can be used to develop knowledge services, followed by discussions of the importance of human networks in knowledge services. The handbook concludes with descriptions of high-performance knowledge service systems. This structure allows different uses: the information can be looked up as needed or read in the order presented. As with any new field, the excitement lies in seeing how to combine these advances in data, information, and human parts of knowledge services in the future. While most books on this subject concentrate on data, information, or knowledge, this handbook integrates coverage of all three, thus providing a complete examination of sustainable knowledge services. The handbook has been carefully designed to be of use to professionals who develop new knowledge services and related businesses, for academic researchers and lecturers to start new research projects, and for students studying knowledge services, knowledge service production, and knowledge service business.

Despite the increasing population (the Food and Agriculture Organization of the United Nations estimates 70% more food will be needed in 2050 than was produced in 2006), issues related to food production have yet to be completely addressed. In recent years, Internet of Things technology has begun to be used to address different industrial and technical challenges to meet this growing need. These Agro-IoT tools boost productivity and minimize the pitfalls of traditional farming, which is the backbone of the world's economy. Aided by the IoT, continuous monitoring of fields provides useful and critical information to farmers, ushering in a new era in farming. The IoT can be used as a tool to combat climate change through greenhouse automation; monitor and manage water, soil and crops; increase productivity; control insecticides/pesticides; detect plant diseases; increase the rate of crop sales; cattle monitoring etc. Agricultural Informatics: Automation Using the IoT and Machine Learning focuses on all these topics, including a few case studies, and they give a clear indication as to why these techniques should now be widely adopted by the agriculture and farming industries.

Stability is a basic concern in both design and analysis of load-carrying systems and constitutes a major topic in the field of engineering science and mechanics. Since structural instability may lead to catastrophic failure of engineering structures, stability requirements must be satisfied besides requirements related to material failure. Knowledge on stability is of great importance in the areas of Civil Engineering, Mechanical Engineering and Aerospace Engineering; and all these disciplines have their own literature related to the subject. This book is intended to present state-of-the art in the stability analysis and to bring a number of researches together exposing the advances in the field. It consists of original and innovative research studies exhibiting various investigation directions.

Geomechanics and Geodynamics of Rock Masses – Selected Papers contains selected contributions from EUROCK 2018, the 2018 International Symposium of the International Society for Rock Mechanics (ISRM 2018, Saint Petersburg, Russia, 22—26 May 2018). Dedicated to recent advances and achievements in the fields of geomechanics and geotechnology, the book will be of interest to researchers and professionals involved in the various branches of rock mechanics and rock engineering. EUROCK 2018, organized by the Saint Petersburg Mining University, is a continuation of the successful series of ISRM symposia in Europe, which began in 1992 in Chester, UK.

Handbook of Probabilistic Models carefully examines the application of advanced probabilistic models in conventional engineering fields. In this comprehensive handbook, practitioners, researchers and scientists will find detailed explanations of technical concepts, applications of the proposed methods, and the respective scientific approaches needed to solve the problem. This book provides an interdisciplinary approach that creates advanced probabilistic models for engineering fields, ranging from conventional fields of mechanical engineering and civil engineering, to electronics, electrical, earth sciences, climate, agriculture, water resource, mathematical sciences and computer sciences. Specific topics covered include minimax probability machine regression, stochastic finite element method, relevance vector machine, logistic regression, Monte Carlo simulations, random matrix, Gaussian process regression, Kalman filter,

stochastic optimization, maximum likelihood, Bayesian inference, Bayesian update, kriging, copula-statistical models, and more. Explains the application of advanced probabilistic models encompassing multidisciplinary research Applies probabilistic modeling to emerging areas in engineering Provides an interdisciplinary approach to probabilistic models and their applications, thus solving a wide range of practical problems

Presents new computer methods in approximation, simulation, and visualization for a host of alpha-stable stochastic processes.

The existing theories for predicting longitudinal dispersion in straight open channels have long been recognized as inadequate when applied to natural rivers. These theories tend to grossly underestimate dispersion in real streams since an important mixing mechanism due to nonuniform river cross-section variations is not explicitly taken into account. Recognizing the important role of stream irregularities on solute transport and the analytical difficulties of classical deterministic analysis, we develop a stochastic approach for analyzing solute transport in natural streams. Variations in river width and bed elevation are conveniently represented as one-dimensional random fields, characterized by their autocorrelation functions. Advection and dispersion due to the combined effect of turbulent diffusion and nonuniform flow are described by the stochastic solute transport equation. When boundary variations are small and statistically homogeneous, a stochastic spectral technique is used to obtain closed-form stochastic solutions. In particular, closed-form expressions are obtained for effective mean solute transport velocity and effective dispersion coefficient reflecting mixing due to flow variations both within the river cross-section and in the streamwise direction. The results show that the mean behavior of solute transport in a statistically irregular stream can be described as a gradient dispersion process. The effective mean transport velocity in natural rivers is smaller than that in a corresponding uniform channel, and the effective longitudinal dispersion coefficient in natural rivers can be considerably greater than that of uniform open channels. The discrepancy between uniform channels and natural rivers increases rapidly as the variances of river width and bed elevation increase, especially when the mean flow Froude number is high.

Much of chemistry, molecular biology, and drug design, are centered around the relationships between chemical structure and measured properties of compounds and polymers, such as viscosity, acidity, solubility, toxicity, enzyme binding, and membrane penetration. For any set of compounds, these relationships are by necessity complicated, particularly when the properties are of biological nature. To investigate and utilize such complicated relationships, henceforth abbreviated SAR for structure-activity relationships, and QSAR for quantitative SAR, we need a description of the variation in chemical structure of relevant compounds and biological targets, good measures of the biological properties, and, of course, an ability to synthesize compounds of interest. In addition, we need reasonable ways to construct and express the relationships, i. e. , mathematical or other models, as well as ways to select the compounds to be investigated so that the resulting QSAR indeed is informative and useful for the stated purposes. In the present context, these purposes typically are the conceptual understanding of the SAR, and the ability to propose new compounds with improved property profiles. Here we discuss the two latter parts of the SARIQSAR problem, i. e. , reasonable ways to model the relationships, and how to select compounds to make the models as "good" as possible. The second is often called the problem of statistical experimental design, which in the present context we call statistical molecular design, SMD. 1.

The practitioner or researcher often faces complex alternatives when selecting a method to characterize properties governing a soil process. After years of research and development, environmental and agricultural professionals now have an array of methods for characterizing soil processes. Well-established methods, however, may not be suitable for

"Completely updated and expanded new edition of this widely cited book, *Modelling Forest Growth and Yield*, 2nd Edition synthesizes current scientific literature, provides insights in how models are constructed, gives suggestions for future developments, and outlines keys for successful implementation of models. The book describes current modeling approaches for predicting forest growth and yield and explores the components that comprise the various modeling approaches. It provides the reader with the tools for evaluating and calibrating growth and yield models and outlines the steps necessary for developing a forest growth and yield model"--

Climate change issues are attracting rapidly increasing interest from a wide range of biologists due to their unprecedented effects on global biodiversity, although there remains a lack of general knowledge as to the environmental consequences of such rapid change. Compared with any other class of animals, birds provide more long-term data and extensive time series, a more geographically and taxonomically diverse source of information, a richer source of data on a greater range of topics dealing with the effects of climate change, and a longer tradition of extensive research. The first edition of the book was widely cited and this new edition continues to provide an exhaustive and up-to-date synthesis of our rapidly expanding level of knowledge as it relates to birds, highlighting new methods and areas for future research.

This book presents a select group of papers that provide a comprehensive view of the models and applications of chaos theory in medicine, biology, ecology, economy, electronics, mechanical, and the human sciences. Covering both the experimental and theoretical aspects of the subject, it examines a range of current topics of interest. It consid

The advent of supercomputers has brought computational fluid dynamics (CFD) to the forefront as a tool to analyze increasingly complex simulation scenarios in many fields. Computational aerodynamics problems are also increasingly moving towards being coupled, multi-physics and multi-scale with complex, moving geometries. The latter presents severe geometry handling and meshing challenges. Simulations also frequently use formal design optimization processes. This book explains the evolution of CFD and provides a comprehensive overview of the plethora of tools and methods available for solving complex scenarios while exploring the future directions and possible outcomes. Using numerous examples, illustrations and computational methods the author discusses turbulence modeling, pre and post processing, coupled solutions, the importance of design optimization, multiphysics problems, reduced order models, and large scale computations and the future of CFD. *Advanced Computational Fluid and Aerodynamics* is suitable for audiences engaged in computational fluid dynamics including advanced undergraduates, researchers and industrial practitioners.

This book is to improve our understanding of mechanisms leading to seizures in humans and in developing new therapeutic options. The book covers topics such as recent approaches to seizure control, recent developments in signal processing of interest for seizure prediction, ictogenesis in complex epileptic brain networks, active probing of the pre-seizure state, non-EEG based approaches to the transition to seizures, microseizures and their role in the generation of clinical seizures, the impact of sleep and long-biological cycles on seizure prediction, as well as animal and computational models of seizures and epilepsy. Furthermore the book covers recent developments of international databases and of parallel computing structures based on Cellular Nonlinear Networks that can play an important role in the realization of a portable seizure warning device. Contents: Epileptic Networks and Their Role for Seizure Prediction and Seizure Control: Transition Into and Out of a Focal Seizure (M de Curtis) Neuronal and Network Dynamics Preceding Experimental Seizures (P Jiruska, F Mormann and J G R Jefferys) Interictal EEG and Its Relevance for Seizure Prediction (A Schulze-Bonhage) Invasive Brain Stimulation in the Treatment of Epilepsy (M Sprengers, R Raedt, A Meurs, E Carrette, D van Roost, P Boon

and K Vonck)Computational Models of Seizures and Epilepsy:Patient-Specific Neural Mass Modeling — Stochastic and Deterministic Methods (D R Freestone, L Kuhlmann, M S Chong, D Nestic and D B Grayden)Computational Modelling of Microseizures and Focal Seizure Onset (Y Wang, M Goodfellow, P N Taylor, D J Garry and G Baier)Predictability of Seizure-Like Events in a Complex Network Model of Integrate-and-Fire Neurons (A Rothkegel and K Lehnertz)Bursting and Synchrony in Networks of Model Neurons (C Geier, A Rothkegel and K Lehnertz)Advances in Analysis and Measurement Techniques:Signal Processing of the EEG: Approaches Tailored to Epilepsy (B Schelter, M Thiel, M Mader and W Mader)From Time Series to Complex Networks: An Overview (S Bialonski and K Lehnertz)Visualizing and Quantifying EEG Complexity on the Base of Ordinal Pattern Distributions (K Keller)Dynamics of Linear and Nonlinear Interrelation Networks in Peri-Ictal Intracranial EEG: Seizure Onset and Termination (C Rummel, M Müller, M Hauf, R Wiest and K Schindler)On the Centrality of the Focus in Human Epileptic Brain Networks (C Geier, M-T Kuhnert, C E Elger and K Lehnertz)Pre-Seizure States in Epileptic Brain Networks: A Surrogate-Assisted, Weighted Network Analysis (G Ansmann, M-T Kuhnert, C E Elger and K Lehnertz)Network Analysis of Generalized Epileptic Discharges (P Ossenblok, P van Houdt, A Lüttjohann and G van Luijtelaar)Signal Processing Platform Based on Cellular Nonlinear Networks (J Müller, J Müller, R Becker and R Tetzlaff)Seizure Prediction by Cellular Nonlinear Networks? (V Senger and R Tetzlaff)Measuring Directed Interactions Using Cellular Neural Networks with Complex Connection Topologies (H Dickten, C E Elger and K Lehnertz)Seizure Prediction Using Optical Measurements of Blood Flow and Oxygenation (M Zhao, H Ma and T H Schwartz)Observing the Sleep-Wake Regulatory System to Improve Prediction of Seizures (M Sedigh-Sarvestani and B J Gluckman)The World's Largest Epilepsy Database: Content and Structure (M Ihle, B Schelter, J Timmer and A Schulze-Bonhage) Readership: Graduate students and professionals in the field of epileptology, neurosurgery and neuroscience. Keywords:Epileptic Networks;Seizure Prediction;Seizure Control;Computational Models;EpilepsyKey Features:Provides latest findings in the field of epilepsy research Forecasting is required in many situations. Stocking an inventory may require forecasts of demand months in advance. Telecommunication routing requires traffic forecasts a few minutes ahead. Whatever the circumstances or time horizons involved, forecasting is an important aid in effective and efficient planning. This textbook provides a comprehensive introduction to forecasting methods and presents enough information about each method for readers to use them sensibly.

Many areas of mining engineering gather and use statistical information, provided by observing the actual operation of equipment, their systems, the development of mining works, surface subsidence that accompanies underground mining, displacement of rocks surrounding surface pits and underground drives and longwalls, amongst others. In addition, the actual modern machines used in surface mining are equipped with diagnostic systems that automatically trace all important machine parameters and send this information to the main producer's computer. Such data not only provide information on the technical properties of the machine but they also have a statistical character. Furthermore, all information gathered during stand and lab investigations where parts, assemblies and whole devices are tested in order to prove their usefulness, have a stochastic character. All of these materials need to be developed statistically and, more importantly, based on these results mining engineers must make decisions whether to undertake actions, connected with the further operation of the machines, the further development of the works, etc. For these reasons, knowledge of modern statistics is necessary for mining engineers; not only as to how statistical analysis of data should be conducted and statistical synthesis should be done, but also as to understanding the results obtained and how to use them to make appropriate decisions in relation to the mining operation. This book on statistical analysis and synthesis starts with a short repetition of probability theory and also includes a special section on statistical prediction. The text is illustrated with many examples taken from mining practice; moreover the tables required to conduct statistical inference are included.

Waves observed in the ocean are extremely irregular and, from a physics standpoint, it seems impossible to describe this chaotic situation. Scientists can describe the situation by means of a stochastic approach. This book describes the stochastic method for ocean wave analysis. This method provides a route to predicting the characteristics of random ocean waves--information vital for the design and safe operation of ships and ocean structures. Assuming a basic knowledge of probability theory, the book begins with a chapter describing the essential elements of wind-generated random seas from the stochastic point of view. The following three chapters introduce spectral analysis techniques, probabilistic predictions of wave amplitudes, wave height and periodicity. A further four chapters discuss sea severity, extreme sea state, the directional wave energy spreading in random seas and special wave events such as wave breaking and group phenomena. Finally the stochastic properties of non-Gaussian waves are presented. Useful appendices and an extensive reference list are included. Examples of practical applications of the theories presented can be found throughout the text. This book will be suitable as a text for graduate students of naval, ocean and coastal engineering. It will also serve as a useful reference for research scientists and engineers working in this field.

On May 27-31, 1985, a series of symposia was held at The University of Western Ontario, London, Canada, to celebrate the 70th birthday of Professor V. M. Joshi. These symposia were chosen to reflect Professor Joshi's research interests as well as areas of expertise in statistical science among faculty in the Departments of Statistical and Actuarial Sciences, Economics, Epidemiology and Biostatistics, and Philosophy. From these symposia, the six volumes which comprise the "Joshi Festschrift" have arisen. The 117 articles in this work reflect the broad interests and high quality of research of those who attended our conference. We would like to thank all of the contributors for their superb cooperation in helping us to complete this project. Our deepest gratitude must go to the three people who have spent so much of their time in the past year typing these volumes: Jackie Bell, Lise Constant, and Sandy Tarnowski. This work has been printed from "camera ready" copy produced by our Vax 785 computer and QMS Lasergraphix printers, using the text processing software TEX. At the initiation of this project, we were neophytes in the use of this system. Thank you, Jackie, Lise, and Sandy, for having the persistence and dedication needed to complete this undertaking.

This book was first published in 2004. Many observed phenomena, from the changing health of a patient to values on the stock market, are characterised by quantities that vary over time: stochastic processes are designed to study them. This book introduces practical methods of applying stochastic processes to an audience knowledgeable only in basic statistics. It covers almost all aspects of the subject and presents the theory in an easily accessible form that is highlighted by application to many examples. These examples arise from dozens of areas, from sociology through medicine to engineering. Complementing these are exercise sets making the book suited for introductory courses in stochastic processes. Software (available from www.cambridge.org) is provided for the freely available R system for the reader to apply to all the models presented.

Mechanics of Structures and Materials: Advancements and Challenges is a collection of peer-reviewed papers presented at the 24th Australasian Conference on the Mechanics of Structures and Materials (ACMSM24, Curtin University, Perth, Western Australia, 6-9 December 2016). The contributions from academics, researchers and practising engineers from Australasian, Asia-pacific region and around the world, cover a wide range of topics, including: • Structural mechanics • Computational mechanics • Reinforced and prestressed concrete structures • Steel structures • Composite structures • Civil engineering materials • Fire engineering • Coastal and offshore structures • Dynamic analysis of structures • Structural health monitoring and damage identification • Structural reliability analysis and design • Structural optimization • Fracture and damage mechanics • Soil mechanics and foundation engineering • Pavement materials and technology • Shock and impact loading • Earthquake loading • Traffic and other man-made loadings • Wave and wind loading • Thermal effects • Design codes Mechanics of Structures and Materials: Advancements and Challenges will be of interest to academics and professionals involved in Structural Engineering and Materials Science.

This book shows the state-of-the-art in Europe on a very new discipline, Space Weather. This discipline lies at the edge between science and industry. This book reflects such a position with theoretic papers and applicative papers as well. Each chapter starts with a short introduction, which shows the coherence of a given domain. Then, four to five contributions written by the best specialists in Europe give detailed hints of a hot topic in space weather.

This is a unique volume by a unique scientist, which combines conceptual, formal, and engineering approaches in a way that is rarely seen. Its core is the relation between ways of learning and knowing on the one hand and different modes of time on the other. Partial Boolean logic and the associated notion of complementarity are used to express this relation, and mathematical tools of fundamental physics are used to formalize it. Along the way many central philosophical problems are touched and addressed, above all the mind-body problem. Completed only shortly before the death of the author, the text has been edited and annotated by the author's close collaborator Harald Atmanspacher.

This new edition adds several new chapters and is thoroughly updated to include data on new topics such as hydraulic fracturing, CO2 sequestration, sustainable groundwater management, and more. Providing a complete treatment of the theory and practice of groundwater engineering, this new handbook also presents a current and detailed review of how to model the flow of water and the transport of contaminants both in the unsaturated and saturated zones, covers the protection of groundwater, and the remediation of contaminated groundwater.

Rock Fragmentation by Blasting contains the papers presented at the 10th International Symposium on Rock Fragmentation by Blasting (New Delhi, India, 26-29 November 2012), and represents the most advanced forum on blasting science and technology. The contributions cover all major recent advancements in blasting and fragmentation, from realistic tre

This volume provides a selected overview of approaches, methods, techniques, tools, systems and technology used to develop knowledge of the service life durability of construction and building materials.

Whole life-cycle costing (WLCC) is rapidly becoming the standard method for the long-term cost appraisal of buildings and civil infrastructure projects. With clients now demanding buildings that demonstrate value for money over the long term, WLCC has become an essential tool for those involved in the design, construction, operation and risk analysis of construction projects.

Whole-life costing: risk and risk responses offers a thorough grounding in both the theory and practical application of WLCC. Part I deals with the fundamentals, providing the general background to appreciate WLCC concepts and whole life risk management techniques at the key decision-making milestones through a project's life. Part II covers the design stage, including service life forecasting and environmental life-cycle assessment techniques in WLCC. Practical frameworks both for assessing whole life risks and risk responses, as well as guidance on developing WLCC budget estimates are also developed. In Part III, the authors consider WLCC during the construction and operations stages, with a strong emphasis upon risk analysis methods and dynamic WLCC assessment. With its mixture of established theory, best practice and innovative approaches, this book will help you make more accurate assessments of the long-term cost effectiveness of projects by: providing a thorough grounding in the theory of WLCC demonstrating how decision-making uncertainty can be reduced by basing choices on sound risk management principles identifying a systematic approach to planning the post-occupancy costs.

This bound edition presents multiple investigations into various aspects of fatigue in composite materials and structures. This work is divided into three sections. The first section presents research into various aspects of fatigue modeling, including prediction of fatigue life, fatigue strength and fatigue crack growth rate. The second section deals primarily with experimental characterization of fatigue in composites, and the third section discusses fatigue behavior of full-scale composite structures. This volume is the third in the American Society for Composites Series on Advances in Composite Materials under the general editorship of Michael Hyer of Virginia Tech. Contributions on fatigue selected for this volume and others in the series are versions of recent ASC presentations which until now were available only on CD-ROM. Keywords include: fatigue, fatigue behavior, fatigue life prediction, multidirectional composite laminates, fatigue modeling, multi-factor interaction model, probabilistic model, composite materials, fatigue life analysis, fatigue limit predictors, fatigue delamination and fatigue damage.

Advances in Hydroscience, Volume 5 contains articles in three major areas of hydroscience, namely, stochastic hydrology, subsurface flow, and solid-state hydrology. This volume is composed of four chapters, and begins with a comprehensive review of the basic concepts, developments, and their potential application in stochastic hydrology, with emphasis on time series analysis and synthesis (model building). The next chapter deals with some of the advances in various scientific disciplines and their application to the analysis and prediction of seepage losses from open channels. These topics are followed by discussions on various phenomena of snow metamorphism, sintering, and development of intergranular bonds; a few methods for determining thermal conductivity, water vapor diffusivity; and the essential concepts of radiation interaction with a snow medium. The final chapter surveys the theory of infiltration, which is one important outcome of the mathematical-physical approach to the study of water movement in unsaturated soil. This chapter specifically presents the general flow equation (a nonlinear Fokker-Planck equation). This book is of great value to hydrologists, engineers, scientists, and researchers who are interested in the interdisciplinary field of hydroscience.

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in Scientific and technical aerospace reports (STAR) and International aerospace abstracts (IAA)

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