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Geophysical Inverse Theory

Princeton University Press In many physical sciences, the most natural description of a system is with a function of position or time. In principle, infinitely many numbers are needed to specify that function, but in practice only finitely many measurements can be made. Inverse theory concerns the mathematical techniques that enable researchers to use the available information to build a model of the unknown system or to determine its essential properties. In *Geophysical Inverse Theory*, Robert Parker provides a systematic development of inverse theory at the graduate and professional level that emphasizes a rigorous yet practical solution of inverse problems, with examples from experimental observations in geomagnetism, seismology, gravity, electromagnetic sounding, and interpolation. Although illustrated with examples from geophysics, this book has broad implications for researchers in applied disciplines from materials science and engineering to astrophysics, oceanography, and meteorology. Parker's approach is to avoid artificial statistical constructs and to emphasize instead the reasonable assumptions researchers must make to reduce the ambiguity that inevitably arises in complex problems. The structure of the book follows a natural division in the subject into linear theory, in which the measured quantities are linear functionals of the unknown models, and nonlinear theory, which covers all other systems but is not nearly so well understood. The book covers model selection as well as techniques for drawing firm conclusions about the earth independent of any particular model.

Time Series Analysis and Inverse Theory for Geophysicists

Cambridge University Press This unique textbook provides the foundation for understanding and applying techniques commonly used in geophysics to process and interpret modern digital data. The geophysicist's toolkit contains a range of techniques which may be divided into two main groups: processing, which concerns time series analysis and is used to separate the signal of interest from background noise; and inversion, which involves generating some map or physical model from the data. These two groups of techniques are normally taught separately, but are here presented together as parts I and II of the book. Part III describes some real applications and includes case studies in seismology, geomagnetism, and gravity. This textbook gives students and practitioners the theoretical background and practical experience, through case studies, computer examples and exercises, to understand and apply new processing methods to modern geophysical datasets. Solutions to the exercises are available on a website at <http://publishing.cambridge.org/resources/0521819652>

Bayesian Approach to Inverse Problems

John Wiley & Sons Many scientific, medical or engineering problems raise the issue of recovering some physical quantities from indirect measurements; for instance, detecting or quantifying flaws or cracks within a material from acoustic or electromagnetic measurements at its surface is an essential problem of non-destructive evaluation. The concept of inverse problems precisely originates from the idea of inverting the laws of physics to recover a quantity of interest from measurable data. Unfortunately, most inverse problems are ill-posed, which means that precise and stable solutions are not easy to devise. Regularization is the key concept to solve inverse problems. The goal of this book is to deal with inverse problems and regularized solutions using the Bayesian statistical tools, with a particular view to signal and image estimation. The first three chapters bring the theoretical notions that make it possible to cast inverse problems within a mathematical framework. The next three chapters address the fundamental inverse problem of deconvolution in a comprehensive manner. Chapters 7 and 8 deal with advanced statistical questions linked to image estimation. In the last five chapters, the main tools introduced in the previous chapters are put into a practical context in important applicative areas, such as astronomy or medical imaging.

Machine Learning and Artificial Intelligence in Geosciences

Academic Press *Advances in Geophysics, Volume 61 - Machine Learning and Artificial Intelligence in Geosciences*, the latest release in this highly-respected publication in the field of geophysics, contains new chapters on a variety of topics, including a historical review on the development of machine learning, machine learning to investigate fault rupture on various scales, a review on machine learning techniques to describe fractured media, signal augmentation to improve the generalization of deep neural networks, deep generator priors for Bayesian seismic inversion, as well as a review on homogenization for seismology, and more. Provides high-level reviews of the latest innovations in geophysics. Written by recognized experts in the field. Presents an essential publication for researchers in all fields of geophysics.

Seismic Reservoir Characterization

An Earth Modelling Perspective

Neural Approaches to Dynamics of Signal Exchanges

Springer Nature The book presents research that contributes to the development of intelligent dialog systems to simplify diverse aspects of everyday life, such as medical diagnosis and entertainment. Covering major thematic areas: machine learning and artificial neural networks; algorithms and models; and social and biometric data for applications in human-computer interfaces, it discusses processing of audio-visual signals for the detection of user-perceived states, the latest scientific discoveries in processing verbal (lexicon, syntax, and pragmatics), auditory (voice, intonation, vocal expressions) and visual signals (gestures, body language, facial expressions), as well as algorithms for detecting communication disorders, remote health-status monitoring, sentiment and affect analysis, social behaviors and engagement. Further, it examines neural and machine learning algorithms for the implementation of advanced telecommunication systems, communication with people with special needs, emotion modulation by computer contents, advanced sensors for tracking changes in real-life and automatic systems, as well as the development of advanced human-computer interfaces. The book does not focus on solving a particular problem, but instead describes the results of research that has positive effects in different fields and applications.

Multiple Scattering of Light by Particles

Radiative Transfer and Coherent Backscattering

Cambridge University Press Monograph on multiple scattering of light by small particles; resource for science professionals, engineers, and graduate students.

The Tectonic Setting and Origin of Cretaceous Batholiths within the North American Cordillera

The Case for Slab Failure Magmatism and Its Significance for Crustal Growth

Geological Society of America In this Special Paper, Hildebrand and Whalen present a big-picture, paradigm-busting synthesis that examines the tectonic setting, temporal relations, and geochemistry of many plutons within Cretaceous batholithic terranes of the North American Cordillera. In addition to their compelling tectonic synthesis, they argue that most of the batholiths are not products of arc magmatism as commonly believed, but instead were formed by slab failure during and after collision. They show that slab window and Precambrian TTG suites share many geochemical similarities with Cretaceous slab failure rocks. Geochemical and isotopic data indicate that the slab failure magmas were derived dominantly from the mantle and thus have been one of the largest contributors to growth of continental crust. The authors also note that slab failure plutons emplaced into the epizone are commonly associated with Cu-Au porphyries, as well as Li-Cs-Ta pegmatites.

Ancient Landscapes of Western North America

A Geologic History with Paleogeographic Maps

Springer Allow yourself to be taken back into deep geologic time when strange creatures roamed the Earth and Western North America looked completely unlike the modern landscape. Volcanic islands stretched from Mexico to Alaska, most of the Pacific Rim didn't exist yet, at least not as widespread dry land; terranes drifted from across the Pacific to dock on Western Americas' shores creating

mountains and more volcanic activity. Landscapes were transposed north or south by thousands of kilometers along huge fault systems. Follow these events through paleogeographic maps that look like satellite views of ancient Earth. Accompanying text takes the reader into the science behind these maps and the geologic history that they portray. The maps and text unfold the complex geologic history of the region as never seen before. Winner of the 2021 John D. Haun Landmark Publication Award, AAPG-Rocky Mountain Section

Light Scattering by Nonspherical Particles

Theory, Measurements, and Applications

Elsevier There is hardly a field of science or engineering that does not have some interest in light scattering by small particles. For example, this subject is important to climatology because the energy budget for the Earth's atmosphere is strongly affected by scattering of solar radiation by cloud and aerosol particles, and the whole discipline of remote sensing relies largely on analyzing the parameters of radiation scattered by aerosols, clouds, and precipitation. The scattering of light by spherical particles can be easily computed using the conventional Mie theory. However, most small solid particles encountered in natural and laboratory conditions have nonspherical shapes. Examples are soot and mineral aerosols, cirrus cloud particles, snow and frost crystals, ocean hydrosols, interplanetary and cometary dust grains, and microorganisms. It is now well known that scattering properties of nonspherical particles can differ dramatically from those of "equivalent" (e.g., equal-volume or equal-surface-area) spheres. Therefore, the ability to accurately compute or measure light scattering by nonspherical particles in order to clearly understand the effects of particle nonsphericity on light scattering is very important. The rapid improvement of computers and experimental techniques over the past 20 years and the development of efficient numerical approaches have resulted in major advances in this field which have not been systematically summarized. Because of the universal importance of electromagnetic scattering by nonspherical particles, papers on different aspects of this subject are scattered over dozens of diverse research and engineering journals. Often experts in one discipline (e.g., biology) are unaware of potentially useful results obtained in another discipline (e.g., antennas and propagation). This leads to an inefficient use of the accumulated knowledge and unnecessary redundancy in research activities. This book offers the first systematic and unified discussion of light scattering by nonspherical particles and its practical applications and represents the state-of-the-art of this important research field. Individual chapters are written by leading experts in respective areas and cover three major disciplines: theoretical and numerical techniques, laboratory measurements, and practical applications. An overview chapter provides a concise general introduction to the subject of nonspherical scattering and should be especially useful to beginners and those interested in fast practical applications. The audience for this book will include graduate students, scientists, and engineers working on specific aspects of electromagnetic scattering by small particles and its applications in remote sensing, geophysics, astrophysics, biomedical optics, and optical engineering. The first systematic and comprehensive treatment of electromagnetic scattering by nonspherical particles and its applications Individual chapters are written by leading experts in respective areas Includes a survey of all the relevant literature scattered over dozens of basic and applied research journals Consistent use of unified definitions and notation makes the book a coherent volume An overview chapter provides a concise general introduction to the subject of light scattering by nonspherical particles Theoretical chapters describe specific easy-to-use computer codes publicly available on the World Wide Web Extensively illustrated with over 200 figures, 4 in color

The Biology of Chameleons

Univ of California Press They change color depending on their mood. They possess uniquely adapted hands and feet distinct from other tetrapods. They feature independently movable eyes. This comprehensive volume delves into these fascinating details and thorough research about one of the most charismatic families of reptiles—Chameleonidae. Written for professional herpetologists, scholars, researchers, and students, this book takes readers on a voyage across time to discover everything that is known about chameleon biology: anatomy, physiology, adaptations, ecology, behavior, biogeography, phylogeny, classification, and conservation. A description of the natural history of chameleons is given, along with the fossil record and typical characteristics of each genus. The state of chameleons in the modern world is also depicted, complete with new information on the most serious threats to these remarkable reptiles.

Discrete Inverse Problems

Insight and Algorithms

SIAM This book gives an introduction to the practical treatment of inverse problems by means of numerical methods, with a focus on basic mathematical and computational aspects. To solve inverse problems, we demonstrate that insight about them goes hand in hand with algorithms.

Mechanics problems in geodynamics. 1 (1995)

Springer Science & Business Media One of two volumes of the proceedings of a symposium held in Beijing in September 1994. The 20 papers cover general global problems, mantle convection and subduction, regional tectonic problems, earthquake mechanisms, and the mechanical properties of rock fractures. Well illustrated. No index. Also published in Pageoph v.145, no.3/4. Annotation copyright by Book News, Inc., Portland, OR

Seismological Tables

Science of the Heart - Exploring the Role of the Heart in Human Performance

The Emerald Planet

How Plants Changed Earth's History

Oxford University Press Plants have profoundly moulded the Earth's climate and the evolutionary trajectory of life. Far from being 'silent witnesses to the passage of time', plants are dynamic components of our world, shaping the environment throughout history as much as that environment has shaped them. In *The Emerald Planet*, David Beerling puts plants centre stage, revealing the crucial role they have played in driving global changes in the environment, in recording hidden facets of Earth's history, and in helping us to predict its future. His account draws together evidence from fossil plants, from experiments with their living counterparts, and from computer models of the 'Earth System', to illuminate the history of our planet and its biodiversity. This new approach reveals how plummeting carbon dioxide levels removed a barrier to the evolution of the leaf: how plants played a starring role in pushing oxygen levels upwards, allowing spectacular giant insects to thrive in the Carboniferous; and it strengthens fascinating and contentious fossil evidence for an ancient hole in the ozone layer. Along the way, Beerling introduces a lively cast of pioneering scientists from Victorian times onwards whose discoveries provided the crucial background to these and the other puzzles. This understanding of our planet's past sheds a sobering light on our own climate-changing activities, and offers clues to what our climatic and ecological futures might look like. There could be no more important time to take a close look at plants, and to understand the history of the world through the stories they tell. Oxford Landmark Science books are 'must-read' classics of modern science writing which have crystallized big ideas, and shaped the way we think.

Rank-Deficient and Discrete Ill-Posed Problems

Numerical Aspects of Linear Inversion

SIAM Here is an overview of modern computational stabilization methods for linear inversion, with applications to a variety of problems in audio processing, medical imaging, tomography, seismology, astronomy, and other areas. Rank-deficient problems involve matrices that are either exactly or nearly rank deficient. Such problems often arise in connection with noise suppression and other problems where the goal is to suppress unwanted disturbances of the given measurements. Discrete ill-posed problems arise in connection with the numerical treatment of inverse problems, where one typically wants to compute information about some interior properties using exterior measurements. Examples of inverse problems are image restoration and tomography, where one needs to improve blurred images or reconstruct pictures from raw data. This book describes, in a common framework, new and existing numerical methods for the analysis and solution of rank-deficient and discrete ill-posed problems. The emphasis is on insight into the stabilizing properties of the algorithms and on the efficiency and reliability of the computations. The setting is that of numerical linear algebra rather than abstract functional analysis, and the theoretical development is complemented with numerical examples and figures that illustrate the features of the various algorithms.

The Deep Mixing Method

CRC Press The Deep Mixing Method (DMM), a deep in-situ soil stabilization technique using cement and/or lime as a stabilizing agent, was developed in Japan and in the Nordic countries independently in the 1970s. Numerous research efforts have been made in these areas investigating properties of treated soil, behavior of DMM improved ground under static and d

Essentials of Paleomagnetism

Univ of California Press "This book by Lisa Tauxe and others is a marvelous tool for education and research in Paleomagnetism. Many students in the U.S. and around the world will welcome this publication, which was previously only available via the Internet. Professor Tauxe has performed a service for teaching and research that is utterly unique."—Neil D. Opdyke, University of Florida

Scientific Inference

Muller Press SCIENTIFIC INFERENCE SCIENTIFIC INFERENCE by HAROLD JEFFREYS M. A., D. Sc., F. R. S. CAMBRIDGE AT THE UNIVERSITY PRESS 1931 CONTENTS Preface, P a g e vii Chapter I LOGIC AND SCIENTIFIC INFERENCE . . . i Chapter II PROBABILITY 8 Chapter III SAMPLING 24 Chapter IV QUANTITATIVE LAWS 36 Chapter V ERRORS 52 Chapter VI PHYSICAL MAGNITUDES 84 Chapter VII MENSURATION 107 Chapter VIII NEWTONIAN DYNAMICS 131 Chapter IX LIGHT AND RELATIVITY 159 VI CONTENTS Chapter X MISCELLANEOUS QUESTIONS . . . page 191 Chapter XI OTHER THEORIES OF SCIENTIFIC KNOWLEDGE . . 218 Appendix I PROBABILITY IN LOGIC AND PURE MATHEMATICS . 229 Appendix II INFINITE NUMBERS 232 Appendix III THE ANALYTIC TREATMENT OF THE SINE AND COSINE 237 Lemmas 240 Index 245 PREFACE THE present work had its beginnings in a series of papers published jointly some years ago by Dr Dorothy Wrinch and myself. Both before and since that time several books purporting to give analyses of the principles of scientific inquiry have appeared, but it seems to me that none of them gives adequate attention to the chief guiding principle of both scientific and everyday knowledge that it is possible to learn from experience and to make inferences from it beyond the data directly known by sensation. Discussions from the philosophical and logical point of view have tended to the conclusion that this principle cannot be justified by logic alone, which is true, and have left it at that. In discussions by physicists, on the other hand, it hardly seems to be noticed that such a principle exists. In the present work the principle is frankly adopted as a primitive postulate and its consequences are developed. It is found to lead to an explanation and a justification of the high probabilities attached in practice to simple quantitative laws, and thereby to a recasting of the processes involved in description. As illustrations of the actual relations of scientific laws to experience it is shown how the sciences of mensuration and dynamics may be developed. I have been stimulated to an interest in the subject myself on account of the fact that in my work in the subjects of cosmology and geophysics it has habitually been necessary to apply physical laws far beyond their original range of verification in both time and distance, and the problems involved in such extrapolation have therefore always been prominent. My thanks are due to the staff of the Cambridge University Press for their care and courtesy also to Dr Wrinch and Mr M. H. A. Newman, who have read the whole in proof and suggested many improvements. HAROLD JEFFREYS ST JOHNS COLLEGE CAMBRIDGE January 1931 CHAPTER I LOGIC AND SCIENTIFIC INFERENCE Contrariwise, continued Tweedledee, if it was so, it might be and if it were so, it would be but as it isn't, it aint. Thats logic. LEWIS CARROLL, Through the Looking Glass 1-1. The fundamental problem of this work is the question of the nature of scientific inference. The data available to the scientific worker, as well as to the man in the street, are composed of two classes. The first class consists of the crude data provided by the senses. These will be called sensations. The second class consists of general principles, which determine how the information provided by the senses is to be treated. It is actually treated in two different ways, which may be called description and inference. Description, in the strict sense, would involve only the cataloguing and classification of sensations already experienced. Inference is the use of sensations already experienced to derive information about sensations not yet experienced, to construct physical objects, and to describe the past and future of these physical objects. For pure description only an application of the principles of classification and the properties of classes is required these are purely logical ideas. Inference requires much more...

The Theory of Probability

OUP Oxford Another title in the reissued Oxford Classic Texts in the Physical Sciences series, Jeffrey's Theory of Probability, first published in 1939, was the first to develop a fundamental theory of scientific inference based on the ideas of Bayesian statistics. His ideas were way ahead of their time and it is only in the past ten years that the subject of Bayes' factors has been significantly developed and extended. Until recently the two schools of statistics (Bayesian and Frequentist) were distinctly different and set apart. Recent work (aided by increased computer power and availability) has changed all that and today's graduate students and researchers all require an understanding of Bayesian ideas. This book is their starting point.

Sonic Warfare

Sound, Affect, and the Ecology of Fear

MIT Press An exploration of the production, transmission, and mutation of affective tonality—when sound helps produce a bad vibe. Sound can be deployed to produce discomfort, express a threat, or create an ambience of fear or dread—to produce a bad vibe. Sonic weapons of this sort include the “psychoacoustic correction” aimed at Panama strongman Manuel Noriega by the U.S. Army and at the Branch Davidians in Waco by the FBI, sonic booms (or “sound bombs”) over the Gaza Strip, and high-frequency rat repellants used against teenagers in malls. At the same time, artists and musicians generate intense frequencies in the search for new aesthetic experiences and new ways of mobilizing bodies in rhythm. In Sonic Warfare, Steve Goodman explores these uses of acoustic force and how they affect populations. Traversing philosophy, science, fiction, aesthetics, and popular culture, he maps a (dis)continuum of vibrational force, encompassing police and military research into acoustic means of crowd control, the corporate deployment of sonic branding, and the intense sonic encounters of sound art and music culture. Goodman concludes with speculations on the not yet heard—the concept of unsound, which relates to both the peripheries of auditory perception and the unactualized nexus of rhythms and frequencies within audible bandwidths.

Rio 2016

Olympic Myths, Hard Realities

Brookings Institution Press A clear-eyed, critical examination of the social, political, and economic costs of hosting the 2016 summer Olympics The selection of Rio de Janeiro as the site of the summer 2016 Olympic Games set off jubilant celebrations in Brazil—and created enormous expectations for economic development and the advancement of Brazil as a major player on the world stage. Although the games were held without major incident, the economic, environmental, political, and social outcomes for Brazil ranged from disappointing to devastating. Corruption scandals trimmed the fat profits that many local real estate developers had envisioned, and the local government was driven into bankruptcy. At the other end of the economic spectrum, some 77,000 residents of Rio's poorest neighborhoods—the favelas—were evicted and forced to move, in many cases as far as 20 or 30 miles to the west. Hosting the games ultimately cost Brazil \$20 billion, with little positive to show for the investment. Rio 2016 assembles the views of leading experts on Brazil and the Olympics into a clear-eyed assessment of the impact of the games on Brazil in general and on the lives of Cariocas, as Rio's residents are known. Edited by sports economist Andrew Zimbalist, the other contributors include Juliana Barbassa, Jules Boykoff, Jamil Chade, Stephen Essex, Renata Latuf, and Theresa Williamson.

Searching the Heavens and the Earth

The History of Jesuit Observatories

Springer Science & Business Media Jesuits established a large number of astronomical, geophysical and meteorological observatories during the 17th and 18th centuries and again during the 19th and 20th centuries throughout the world. The history of these observatories has never been published in a complete form. Many early European astronomical observatories were established in Jesuit colleges. During the 17th and 18th centuries Jesuits were the first western scientists to enter into contact with China and India. It was through them that western astronomy was first introduced in these countries. They made early astronomical observations in India and China and they directed for 150 years the Imperial Observatory of Beijing. In the 19th and 20th centuries a new set of observatories were established. Besides astronomy these now included meteorology and geophysics. Jesuits established some of the earliest observatories in Africa, South America and the Far East. Jesuit observatories constitute an often forgotten chapter of the history of these sciences.

A Recursive Vision

Ecological Understanding and Gregory Bateson

University of Toronto Press Gregory Bateson was one of the most original social scientists of this century. He is widely known as author of key ideas used in family therapy - including the well-known condition called 'double bind' . He was also one of the most influential figures in cultural anthropology. In the decade before his death in 1980 Bateson turned toward a consideration of ecology. Standard ecology concentrates on an ecosystem's biomass and on energy budgets supporting life. Bateson came to the conclusion that understanding ecological organization requires a complete switch in scientific perspective. He reasoned that ecological phenomena must be explained primarily through patterns of information and that only through perceiving these informational patterns will we uncover the elusive unity, or integration, of ecosystems. Bateson believed that relying upon the materialist framework of knowledge dominant in ecological science will deepen errors of interpretation and, in the end, promote eco-crisis. He saw recursive patterns of communication as the basis of order in both natural and human domains. He conducted his investigation first in small-scale social settings; then among octopus, otters, and dolphins. Later he took these investigations to the broader setting of evolutionary analysis and developed a framework of thinking he called 'an ecology of mind.' Finally, his inquiry included an ecology of mind in ecological settings - a recursive epistemology. This is the first study of the whole range of Bateson's ecological thought - a comprehensive presentation of Bateson's matrix of ideas. Drawing on unpublished letters and papers, Harries-Jones clarifies themes scattered throughout Bateson's own writings, revealing the conceptual consistency inherent in Bateson's position, and elaborating ways in which he pioneered aspects of late twentieth-century thought.

Optimization for Machine Learning

MIT Press An up-to-date account of the interplay between optimization and machine learning, accessible to students and researchers in both communities. The interplay between optimization and machine learning is one of the most important developments in modern computational science. Optimization formulations and methods are proving to be vital in designing algorithms to extract essential knowledge from huge volumes of data. Machine learning, however, is not simply a consumer of optimization technology but a rapidly evolving field that is itself generating new optimization ideas. This book captures the state of the art of the interaction between optimization and machine learning in a way that is accessible to researchers in both fields. Optimization approaches have enjoyed prominence in machine learning because of their wide applicability and attractive theoretical properties. The increasing complexity, size, and variety of today's machine learning models call for the reassessment of existing assumptions. This book starts the process of reassessment. It describes the resurgence in novel contexts of established frameworks such as first-order methods, stochastic approximations, convex relaxations, interior-point methods, and proximal methods. It also devotes attention to newer themes such as regularized optimization, robust optimization, gradient and subgradient methods, splitting

techniques, and second-order methods. Many of these techniques draw inspiration from other fields, including operations research, theoretical computer science, and subfields of optimization. The book will enrich the ongoing cross-fertilization between the machine learning community and these other fields, and within the broader optimization community.

The Second World Ocean Assessment

World Ocean Assessment II

The second World Ocean Assessment is a collaborative effort of hundreds of experts from all regions of the world, a comprehensive and integrated assessment of the state of marine environment.

Ocean Acoustics

Springer Science & Business Media This Topics volume is devoted to a study of sound propagation in the ocean. The effect of the interior of the ocean on underwater sound is analogous to the effect of a lens on light. The oceanic lens is related, as in light propagation, to the index of refraction of the medium. The latter is given by the ratio of the sound frequency to the speed of sound in water, typically about 1500 m s^{-1} . It is the variation of the sound speed due to changing temperature, density, salinity, and pressure in the complex ocean environment which creates the lens effect. Many oceanic processes such as currents, tides, eddies (circulating, translating regions of water), and internal waves (the wave-like structure of the oceanic density variability) contribute in turn to the changes in sound speed. The net effect of the ocean lens is to trap and guide sound waves in a channel created by the lens. The trapped sound can then propagate thousands of miles in this oceanic waveguide. In addition to the propagation in the interior of the ocean, sound can propagate into and back out of the ocean bottom as well as scatter from the ocean surface. Just as the sound produced by a loudspeaker in a room is affected by the walls of the room, so the ocean boundaries and the material properties below the ocean bottom are essential ingredients in the problem.

Formation and Structure of Planets

Elsevier Formation and Structure of Planets, Volume 62 in the Advances in Geophysics series, highlights new chapters on a variety of topics in the field, including The evolution of multi-method imaging of structures and processes in environmental geophysics, An introduction to variational inference in Geophysical inverse problems, Moment tensor inversion, and more. Provides high-level reviews of the latest innovations in geophysics Written by recognized experts in the field Presents an essential publication for researchers in all fields of geophysics

Magnetic Measurement Techniques for Materials Characterization

Springer Nature This book discusses the most commonly used techniques for characterizing magnetic material properties and their applications. It provides a comprehensive and easily digestible collection and review of magnetic measurement techniques. It also examines the underlying operating principles and techniques of magnetic measurements, and presents current examples where such measurements and properties are relevant. Given the pervasive nature of magnetic materials in everyday life, this book is a vital resource for both professionals and students wishing to deepen their understanding of the subject.

Neural Networks for Chemical Engineers

Elsevier Science Limited Hardbound. Although neural and connectionist models have been known for decades, their first appearance in chemical engineering was as late as 1988. This book is an attempt to expedite a cautious intake of neural networks into chemical engineering. Besides core chemical engineering, it includes applications in process engineering, biochemical engineering, and metallurgical engineering. Of the 27 chapters, six cover theoretical issues and the remaining 21 cover applications.

3D Seismic Imaging

SEG Books Accompanying CD-ROM includes PDF slides for teaching the material in the book and the C3-narrow-azimuth classic data set.

Imagining Urban Futures

Cities in Science Fiction and What We Might Learn from Them

Wesleyan University Press Carl Abbott, who has taught urban studies and urban planning in five decades, brings together urban studies and literary studies to examine how fictional cities in work by authors as different as E. M. Forster, Isaac Asimov, Kim Stanley Robinson, and China Miéville might help us to envision an urban future that is viable and resilient. Imagining Urban Futures is a remarkable treatise on what is best and strongest in urban theory and practice today, as refracted and intensely imagined in science fiction. As the human population grows, we can envision an increasingly urban society. Shifting weather patterns, rising sea levels, reduced access to resources, and a host of other issues will radically impact urban environments, while technology holds out the dream of cities beyond Earth. Abbott delivers a compelling critical discussion of science fiction cities found in literary works, television programs, and films of many eras from Metropolis to Blade Runner and Soylent Green to The Hunger Games, among many others.

Computational Seismology

Springer Science & Business Media sense do not grow as fast as computational possibilities. This book contains selections from Volumes I-V of the series "Computational Seismology," which Moreover, for some strange reason, computation was initiated a few years ago by the Academy of Sciences of the USSR. Volume V was still in preparation intended to provide time for meditation. In comparison when the translation was begun, and the computerizing seismology, therefore, one must first translate papers from it were made from manual generalizations of the methods and then make them more scripts. Most of the authors are members of the rigorous mathematical Department of Computational Geophysics of the Institute of Physics of the Earth, Moscow. hypotheses should be avoided. Particular attention The series is dedicated to theoretical and must be given to exact formulation of the problem, computational aspects of the analysis of seismology to questions of uniqueness and stability, to the final data. The present state of this field is typical of the limits of the results, etc. This general approach of our times. The rapidly increasing flow of information is required in solving the main problems of seismology is already too vast to be processed or even modern seismology, which are by definition general comprehended in a traditional way. This has forced problems. This approach has other advantages.

Art and Sustainability

Connecting Patterns for a Culture of Complexity

transcript Verlag What is the cultural dimension of sustainability? This book offers a thought-provoking answer, with a theoretical synthesis on »cultures of sustainability«. Describing how modernity degenerated into a culture of unsustainability, to which the arts are contributing, Sacha Kagan engages us in a fundamental rethinking of our ways of knowing and seeing the world. We must learn not to be afraid of complexity, and to re-awaken a sensibility to patterns that connect. With an overview of ecological art over the past 40 years, and a discussion of art and social change, the book assesses the potential role of art in a much needed transformation process.

Geo-Economics: The Interplay between Geopolitics, Economics, and Investments

CFA Institute Research Foundation Today's investors need to understand geopolitical trends as a main driving force of markets. This book provides just that: an understanding of the interplay between geopolitics and economics, and of the impact of that dynamic on financial markets. To me, geo-economics is the study of how geopolitics and economics interact in international relations. Plenty of books on geopolitics have been written by eminent experts in politics and international affairs. This book is not one of them. First, I am neither a political scientist nor an expert in international affairs. I am an economist and an investment strategist who has been fascinated by geopolitics for many years. And this fascination has led me to the realization that almost all books and articles written on geopolitics are useless for investors. Political scientists are not trained to think like investors, and they are not typically trained in quantitative methods. Instead, they engage in developing narratives for geopolitical events and processes that pose risks and opportunities for investors. My main problem with these narratives is that they usually do not pass the "so what?" test. Geopolitical risks are important, but how am I to assess which risks are important for my portfolio and which ones are simply noise? Because geopolitics experts focus on politics, they do not provide an answer to this crucial question for investors. What could be important for a geopolitics expert and for global politics could be totally irrelevant for investors. For example, the US wars in Iraq and Afghanistan have been going on for almost two decades now and have been an important influence on the political discussion in the United States. But for investors, the war in Afghanistan was a total nonevent, and the war in Iraq had only a fleeting influence, when it started in 2003. Geopolitics experts cannot answer the question of which geopolitical events matter for investors and which do not. Unfortunately, some experts thus claim that all geopolitical risks matter and that these risks cannot be quantified but only assessed qualitatively. Nothing could be further from the truth. In the chapters that follow, I discuss geopolitical and geo-economic events from the viewpoint of an investor and show that they can be quantified and introduced as part of a traditional risk management process. I do this in two parts. The first part of this book focuses on geopolitics that matters to investors. It reviews the literature on a range of geopolitical events and shows which events have a material economic effect and which do not. The second part of this book puts the insights from those first chapters into practice by applying them to current geopolitical trends. In this second part, I stick my head out and examine the impact the geopolitical trends have on the economy and financial markets today and their likely development in the coming years. —Joachim Klement, CFA

Magnetohydrodynamics

Historical Evolution and Trends

Springer Science & Business Media This book revises the evolution of ideas in various branches of magnetohydrodynamics (astrophysics, earth and solar dynamos, pinch, MHD turbulence and liquid metals) and reviews current trends and challenges. Uniquely, it contains the review articles on the development of the subject by pioneers in the field as well as leading experts, not just in one, but in various branches of magnetohydrodynamics, such as liquid metals, astrophysics, dynamo and pinch.

Geology and Genesis of Major Copper Deposits and Districts of the World

A Tribute to Richard H. Sillitoe

Energy, Information, Feedback, Adaptation, and Self-organization

The Fundamental Elements of Life and Society

Springer This unique book offers a comprehensive and integrated introduction to the five fundamental elements of life and society: energy, information, feedback, adaptation, and self-organization. It is divided into two parts. Part I is concerned with energy (definition, history, energy types, energy sources, environmental impact); thermodynamics (laws, entropy definitions, energy, branches of thermodynamics, entropy interpretations, arrow of time); information (communication and transmission, modulation-demodulation, coding-decoding, information theory, information technology, information science, information systems); feedback control (history, classical methodologies, modern methodologies); adaptation (definition, mechanisms, measurement, complex adaptive systems, complexity, emergence); and self-organization (definitions/opinions, self-organized criticality, cybernetics, self-organization in complex adaptive systems, examples in nature). In turn, Part II studies the roles, impacts, and applications of the five above-mentioned elements in life and society, namely energy (biochemical energy pathways, energy flows through food chains, evolution of energy resources, energy and economy); information (information in biology, biocomputation, information technology in office automation, power generation/distribution, manufacturing, business, transportation), feedback (temperature, water, sugar and hydrogen ion regulation, autocatalysis, biological modeling, control of hard/technological and soft/managerial systems), adaptation and self-organization (ecosystems, climate change, stock market, knowledge management, man-made self-organized controllers, traffic lights control).

Mathematical Programming and Game Theory

Springer This book discusses recent developments in mathematical programming and game theory, and the application of several mathematical models to problems in finance, games, economics and graph theory. All contributing authors are eminent researchers in their respective fields, from across the world. This book contains a collection of selected papers presented at the 2017 Symposium on Mathematical Programming and Game Theory at New Delhi during 9-11 January 2017. Researchers, professionals and graduate students will find the book an essential resource for current work in mathematical programming, game theory and their applications in finance, economics and graph theory. The symposium provides a forum for new developments and applications of mathematical programming and game theory as well as an excellent opportunity to disseminate the latest major achievements and to explore new directions and perspectives.