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Future Trends in Geomathematics - Richard G. Craig 1981

Geological Newsletter - International Union of Geological Sciences 1974

Spectral Methods in Geodesy and Geophysics - Christopher Jekeli 2017-10-02
The text develops the principal aspects of applied Fourier analysis and methodology with the main goal to inculcate a different way of perceiving global and regional geodetic and geophysical data, namely from the perspective of the frequency, or spectral, domain rather than the spatial domain. The word "methods" in the title is meant to convey that the transformation of a geophysical signal into the spectral domain can be applied for purposes of analysis as well as rapid computation. The text is written for graduate students; however, Chapters 1 through 4 and parts of 5 can also benefit undergraduates who have a solid and fluent knowledge of integral and differential calculus, have some statistical background, and are not uncomfortable with complex numbers. Concepts are developed by starting from the one-dimensional domain and working up to the spherical domain, which is part of every chapter. Many concepts are illustrated graphically with actual geophysical data primarily from signals of

gravity, magnetism, and topography.
Geologie en Mijnbouw 1979

Inverse Magnetometry - Christian Blick 2021-09-08
This monograph presents the geoscientific context arising in decorrelative geomagnetic exploration. First, an insight into the current state of research is given by reducing magnetometry to mathematically accessible, and thus calculable, decorrelated models. In this way, various questions and problems of magnetometry are made available to a broad scientific audience and the exploration industry. New stimuli are given, and innovative ways of modeling geologic strata by mollifier magnetometric techniques are shown. Potential data sets primarily of terrestrial origin constitute the main data basis in the book. For deep geology, the geomathematical decorrelation methods are designed in such a way that depth information (e.g., in boreholes) may be canonically entered. Overall, this book provides pioneering and ground-breaking innovative mathematical knowledge as a transfer methodology from the "reality space" of magnetometric measurements into the "virtual space" of mathematical-numerical modeling structures and mollifier solutions with novel geological application areas. It pursues a double

goal: On the one hand, it represents a geoscientific set of rules for today's geoengineering, interested in the application of innovative modelling and simulation techniques to promising data sets and structures occurring in geomagnetics. On the other hand, the book serves as a collection of current material in Applied Mathematics to offer alternative methodologies in the theory of inverse problems.

Handbook of Geomathematics - Willi Freeden 2010-08-13
During the last three decades geosciences and geo-engineering were influenced by two essential scenarios: First, the technological progress has changed completely the observational and measurement techniques. Modern high speed computers and satellite based techniques are entering more and more all geodisciplines. Second, there is a growing public concern about the future of our planet, its climate, its environment, and about an expected shortage of natural resources. Obviously, both aspects, viz. efficient strategies of protection against threats of a changing Earth and the exceptional situation of getting terrestrial, airborne as well as spaceborne data of better and better quality explain the strong need of new mathematical structures, tools, and methods. Mathematics concerned with geoscientific problems, i.e., Geomathematics, is becoming increasingly important. The 'Handbook Geomathematics' as a central reference work in this area comprises the following scientific fields: (I) observational and measurement key technologies (II) modelling of the system Earth (geosphere, cryosphere, hydrosphere, atmosphere, biosphere) (III) analytic, algebraic, and operator-theoretic methods (IV) statistical and stochastic methods (V) computational and numerical analysis methods (VI) historical background and future perspectives.

Geomathematics - Volker Michel 2022-04-28
A comprehensive summary of the fundamental mathematical principles behind key topics in geophysics and geodesy. Each section begins with a problem in gravimetry, geomagnetics or seismology and analyses its mathematical features. With each chapter ending with a series of review questions, this is a valuable reference for students and researchers.

Geological Newsletter 1974

Serials Holdings in the Linda Hall Library - Linda Hall Library 1986

Books in Print - 1994

Progress in Geomathematics - Graeme Bonham-Carter 2008-09-20
Celebrating Frits Agterberg's half-century of publication activity in geomathematics, this volume's 28 timely papers, written by his friends and colleagues, treat a variety of subjects of current interest, many of them also studied by Frits, including: spatial analysis in mineral resource assessment, quantitative stratigraphy, nonlinear multifractal models, compositional data analysis, time series analysis, image analysis, and geostatistics. Professor Agterberg published his first paper as a graduate student in 1958 and has since produced (and continues to publish) a steady stream of research papers on a wide variety of subjects of interest to geomathematical practitioners. Most of the papers included here address methodology and feature practical case studies, so that the book likely has broad appeal to those interested in mathematical geosciences, both to academic researchers seeking a comprehensive overview and also to practitioners of geomathematical approaches in industry.

Decorrelative Mollifier Gravimetry - Willi Freeden 2021-05-12
This monograph presents the geoscientific context arising in decorrelative gravitational exploration to determine the mass density distribution inside the Earth. First, an insight into the current state of research is given by reducing gravimetry to mathematically accessible, and thus calculable, decorrelated models. In this way, the various unresolved questions and problems of gravimetry are made available to a broad scientific audience and the exploration industry. New theoretical developments will be given, and innovative ways of modeling geologic layers and faults by mollifier regularization techniques are shown. This book is dedicated to surface as well as volume geology with potential data primarily of terrestrial origin. For deep geology, the geomathematical decorrelation methods are to

be designed in such a way that depth information (e.g., in boreholes) may be canonically entered. Bridging several different geo-disciplines, this book leads in a cycle from the potential measurements made by geoengineers, to the cleansing of data by geophysicists and geoengineers, to the subsequent theory and model formation, computer-based implementation, and numerical calculation and simulations made by geomathematicians, to interpretation by geologists, and, if necessary, back. It therefore spans the spectrum from geoengineering, especially geodesy, via geophysics to geomathematics and geology, and back. Using the German Saarland area for methodological tests, important new fields of application are opened, particularly for regions with mining-related cavities or dense development in today's geo-exploration.

Geomathematics: Theoretical Foundations, Applications and Future Developments Frits Agterberg 2014-07-14
This book provides a wealth of geomathematical case history studies performed by the author during his career at the Ministry of Natural Resources Canada, Geological Survey of Canada (NRCan-GSC). Several of the techniques newly developed by the author and colleagues that are described in this book have become widely adopted, not only for further research by geomathematical colleagues, but by government organizations and industry worldwide. These include Weights-of-Evidence modelling, mineral resource estimation technology, trend surface analysis, automatic stratigraphic correlation and nonlinear geochemical exploration methods. The author has developed maximum likelihood methodology and spline-fitting techniques for the construction of the international numerical geologic timescale. He has introduced the application of new theory of fractals and multi fractals in the geostatistical evaluation of regional mineral resources and ore reserves and to study the spatial distribution of metals in rocks. The book also contains sections deemed important by the author but that have not been widely adopted because they require further research. These include the geometry of preferred orientations of contours and edge effects on maps, time series analysis of

Quaternary retreating ice sheet related sedimentary data, estimation of first and last appearances of fossil taxa from frequency distributions of their observed first and last occurrences, tectonic reactivation along pre-existing schistosity planes in fold belts, use of the grouped jackknife method for bias reduction in geometrical extrapolations and new applications of the theory of permanent, volume-independent frequency distributions.
Technical Book Review Index - 1979

Handbook of Mathematical Geodesy - Willi Freeden 2018-06-11
Written by leading experts, this book provides a clear and comprehensive survey of the "status quo" of the interrelating process and cross-fertilization of structures and methods in mathematical geodesy. Starting with a foundation of functional analysis, potential theory, constructive approximation, special function theory, and inverse problems, readers are subsequently introduced to today's least squares approximation, spherical harmonics reflected spline and wavelet concepts, boundary value problems, Runge-Walsh framework, geodetic observables, geoidal modeling, ill-posed problems and regularizations, inverse gravimetry, and satellite gravity gradiometry. All chapters are self-contained and can be studied individually, making the book an ideal resource for both graduate students and active researchers who want to acquaint themselves with the mathematical aspects of modern geodesy.

Geomathematically Oriented Potential Theory - Willi Freeden 2012-10-30
As the Earth`s surface deviates from its spherical shape by less than 0.4 percent of its radius and today's satellite missions collect their gravitational and magnetic data on nearly spherical orbits, sphere-oriented mathematical methods and tools play important roles in studying the Earth's gravitational and magnetic field. Geomathematically Orien

New Technical Books - New York Public Library 1978

Compositional Data Analysis Josep Antoni Martín-Fernández 2016-11-19
The authoritative contributions gathered in this

volume reflect the state of the art in compositional data analysis (CoDa). The respective chapters cover all aspects of CoDa, ranging from mathematical theory, statistical methods and techniques to its broad range of applications in geochemistry, the life sciences and other disciplines. The selected and peer-reviewed papers were originally presented at the 6th International Workshop on Compositional Data Analysis, CoDaWork 2015, held in L'Escala (Girona), Spain. Compositional data is defined as vectors of positive components and constant sum, and, more generally, all those vectors representing parts of a whole which only carry relative information. Examples of compositional data can be found in many different fields such as geology, chemistry, economics, medicine, ecology and sociology. As most of the classical statistical techniques are incoherent on compositions, in the 1980s John Aitchison proposed the log-ratio approach to CoDa. This became the foundation of modern CoDa, which is now based on a specific geometric structure for the simplex, an appropriate representation of the sample space of compositional data. The International Workshops on Compositional Data Analysis offer a vital discussion forum for researchers and practitioners concerned with the statistical treatment and modelling of compositional data or other constrained data sets and the interpretation of models and their applications. The goal of the workshops is to summarize and share recent developments, and to identify important lines of future research.

Current Index to Statistics, Applications, Methods and Theory - 1982
The Current Index to Statistics (CIS) is a bibliographic index of publications in statistics, probability, and related fields.

Integration and Cubature Methods - Willi Freeden 2017-11-22
In industry and economics, the most common solutions of partial differential equations involving multivariate numerical integration over cuboids include techniques of iterated one-dimensional approximate integration. In geosciences, however, the integrals are extended over potato-like volumes (such as the ball, ellipsoid, geoid, or the Earth) and their boundary surfaces which require specific multi-variate approximate integration methods.

Integration and Cubature Methods: A Geomathematically Oriented Course provides a basic foundation for students, researchers, and practitioners interested in precisely these areas, as well as breaking new ground in integration and cubature in geomathematics.

Calcareous Nannofossil Biostratigraphy - Michael Montenari 2021-11-13
Stratigraphy & Timescales, Volume Six in the Advances in Sequence Stratigraphy series covers research in stratigraphic disciplines, including the most recent developments in the geosciences. This fully commissioned review publication aims to foster and convey progress in stratigraphy with its inclusion of a variety of topics, including Carbon isotope stratigraphy - principles and applications, Interpreting Phanerozoic d13C patterns as periodic glacio-eustatic sequences, Stable carbon isotopes in archaeological plant remains, Review of the Upper Ediacaran-Lower Cambrian Detrital Series in Central and North Iberia: NE Africa as possible Source Area, Calibrating d13C and d18O chemostratigraphic correlations across Cambrian strata of SW, and much more. Contains contributions from leading authorities in the field Informs and updates on all the latest developments in the field Aims to foster and convey progress in stratigraphy, including geochronology, magnetostratigraphy, lithostratigraphy, event-stratigraphy, and more

Handbook of Mathematical Geosciences - B.S. Daya Sagar 2018-06-25
This Open Access handbook published at the IAMG's 50th anniversary, presents a compilation of invited path-breaking research contributions by award-winning geoscientists who have been instrumental in shaping the IAMG. It contains 45 chapters that are categorized broadly into five parts (i) theory, (ii) general applications, (iii) exploration and resource estimation, (iv) reviews, and (v) reminiscences covering related topics like mathematical geosciences, mathematical morphology, geostatistics, fractals and multifractals, spatial statistics, multipoint geostatistics, compositional data analysis, informatics, geocomputation, numerical methods, and chaos theory in the geosciences.

Multiscale Potential Theory - Willi Freeden 2004-09-21
This self-contained text/reference provides a

basic foundation for practitioners, researchers, and students interested in any of the diverse areas of multiscale (geo)potential theory. New mathematical methods are developed enabling the gravitational potential of a planetary body to be modeled using a continuous flow of observations from land or satellite devices. Harmonic wavelets methods are introduced, as well as fast computational schemes and various numerical test examples. Presented are multiscale approaches for numerous geoscientific problems, including geoidal determination, magnetic field reconstruction, deformation analysis, and density variation modelling With exercises at the end of each chapter, the book may be used as a textbook for graduate-level courses in geomathematics, applied mathematics, and geophysics. The work is also an up-to-date reference text for geoscientists, applied mathematicians, and engineers.

Acta Geodaetica Et Geophysica Hungarica - 2006

Interdisciplinary Mathematics Education Brian Doig 2019-02-22
This open access book is the first major publication on the topic of "Interdisciplinary Mathematics Education" and arose from the work of the first International Topic Study Group of the same name at the ICME-13 conference in Hamburg in 2016. It offers extensive theoretical insights, empirical research, and practitioner accounts of interdisciplinary mathematics work in STEM and beyond (e.g. in music and the arts). Scholars and practitioners from four continents contributed to this comprehensive book, and present studies on: the conceptualizations of interdisciplinarity; implementation cases at schools and tertiary institutions; teacher education; and implications for policy and practice. Each chapter, and the book itself, closes with an assessment of the most significant aspects that those involved in policy and practice, as well as future researchers, should take into account.
American Book Publishing Record - 1976

Current Serials Received - British Library. Document Supply Centre 1991

Energy Research Abstracts - 1985

Geomathematics: Theoretical Foundations, Applications and Future Developments Frits Agterberg 2016-09-17
This book provides a wealth of geomathematical case history studies performed by the author during his career at the Ministry of Natural Resources Canada, Geological Survey of Canada (NRCan-GSC). Several of the techniques newly developed by the author and colleagues that are described in this book have become widely adopted, not only for further research by geomathematical colleagues, but by government organizations and industry worldwide. These include Weights-of-Evidence modelling, mineral resource estimation technology, trend surface analysis, automatic stratigraphic correlation and nonlinear geochemical exploration methods. The author has developed maximum likelihood methodology and spline-fitting techniques for the construction of the international numerical geologic timescale. He has introduced the application of new theory of fractals and multi fractals in the geostatistical evaluation of regional mineral resources and ore reserves and to study the spatial distribution of metals in rocks. The book also contains sections deemed important by the author but that have not been widely adopted because they require further research. These include the geometry of preferred orientations of contours and edge effects on maps, time series analysis of Quaternary retreating ice sheet related sedimentary data, estimation of first and last appearances of fossil taxa from frequency distributions of their observed first and last occurrences, tectonic reactivation along pre-existing schistosity planes in fold belts, use of the grouped jackknife method for bias reduction in geometrical extrapolations and new applications of the theory of permanent, volume-independent frequency distributions.

Special Functions of Mathematical (Geo-)Physics - Willi Freeden 2013-02-15
Special functions enable us to formulate a scientific problem by reduction such that a new, more concrete problem can be attacked within a well-structured framework, usually in the context of differential equations. A good understanding of special functions provides the

capacity to recognize the causality between the abstractness of the mathematical concept and both the impact on and cross-sectional importance to the scientific reality. The special functions to be discussed in this monograph vary greatly, depending on the measurement parameters examined (gravitation, electric and magnetic fields, deformation, climate observables, fluid flow, etc.) and on the respective field characteristic (potential field, diffusion field, wave field). The differential equation under consideration determines the type of special functions that are needed in the desired reduction process. Each chapter closes with exercises that reflect significant topics, mostly in computational applications. As a result, readers are not only directly confronted with the specific contents of each chapter, but also with additional knowledge on mathematical fields of research, where special functions are essential to application. All in all, the book is an equally valuable resource for education in geomathematics and the study of applied and harmonic analysis. Students who wish to continue with further studies should consult the literature given as supplements for each topic covered in the exercises.

Spherical Functions of Mathematical Geosciences - Willi Freeden 2022
This book is an enlarged second edition of a monograph published in the Springer AGEM2-Series, 2009. It presents, in a consistent and unified overview, a setup of the theory of spherical functions of mathematical (geo-)sciences. The content shows a twofold transition: First, the natural transition from scalar to vectorial and tensorial theory of spherical harmonics is given in a coordinate-free context, based on variants of the addition theorem, Funk-Hecke formulas, and Helmholtz as well as Hardy-Hodge decompositions. Second, the canonical transition from spherical harmonics via zonal (kernel) functions to the Dirac kernel is given in close orientation to an uncertainty principle classifying the space/frequency (momentum) behavior of the functions for purposes of data analysis and (geo-)application. The whole palette of spherical functions is collected in a well-structured form for modeling and simulating the phenomena and processes occurring in the Earth's system. The

result is a work which, while reflecting the present state of knowledge in a time-related manner, claims to be of largely timeless significance in (geo-)mathematical research and teaching.

Lectures on Constructive Approximation - Volker Michel 2012-12-12
Lectures on Constructive Approximation: Fourier, Spline, and Wavelet Methods on the Real Line, the Sphere, and the Ball focuses on spherical problems as they occur in the geosciences and medical imaging. It comprises the author's lectures on classical approximation methods based on orthogonal polynomials and selected modern tools such as splines and wavelets. Methods for approximating functions on the real line are treated first, as they provide the foundations for the methods on the sphere and the ball and are useful for the analysis of time-dependent (spherical) problems. The author then examines the transfer of these spherical methods to problems on the ball, such as the modeling of the Earth's or the brain's interior. Specific topics covered include: * the advantages and disadvantages of Fourier, spline, and wavelet methods * theory and numerics of orthogonal polynomials on intervals, spheres, and balls * cubic splines and splines based on reproducing kernels * multiresolution analysis using wavelets and scaling functions This textbook is written for students in mathematics, physics, engineering, and the geosciences who have a basic background in analysis and linear algebra. The work may also be suitable as a self-study resource for researchers in the above-mentioned fields.

Books in Series, 1985-89 - 1989

Bookseller and the Stationery Trades' Journal - 1980

Dictionary of Mathematical Geosciences - Richard J. Howarth 2017-05-27
This dictionary includes a number of mathematical, statistical and computing terms and their definitions to assist geoscientists and provide guidance on the methods and terminology encountered in the literature. Each technical term used in the explanations can be found in the dictionary which also includes explanations of basics, such as trigonometric

functions and logarithms. There are also citations from the relevant literature to show the term's first use in mathematics, statistics, etc. and its subsequent usage in geosciences.

IX Hotine-Marussi Symposium on Mathematical Geodesy - Pavel Novák 2020-09-16
This volume gathers the proceedings of the IX Hotine-Marussi Symposium on Mathematical Geodesy, which was held from 18 to 22 June 2018 at the Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy. Since 2006, the Hotine-Marussi Symposia series has been produced under the auspices of the Inter-Commission Committee on Theory (ICCT) within the International Association of Geodesy (IAG). The ICCT has organized the last four Hotine-Marussi Symposia, held in Wuhan (2006) and Rome (2009, 2013 and 2018). The overall goal of the ICCT and Hotine-Marussi Symposia has always been to advance geodetic theory, as reflected in the 25 peer-reviewed research articles presented here. The IX Hotine-Marussi Symposium was divided into 10 topical sessions covering all aspects of geodetic theory including reference frames, gravity field modelling, adjustment theory, atmosphere, time series analysis and advanced numerical methods. In total 118 participants attended the Symposium and delivered 82 oral and 37 poster presentations. During a special session at the Accademia Nazionale deiLincei, the oldest scientific academy in the world, six invited speakers discussed interactions of geodesy with oceanography, glaciology, atmospheric research, mathematics, Earth science and seismology.

Digital Terrain Analysis in Soil Science and Geology - Igor Florinsky 2016-07-11
Digital Terrain Analysis in Soil Science and Geology, Second Edition, synthesizes the knowledge on methods and applications of digital terrain analysis and geomorphometry in the context of multi-scale problems in soil science and geology. Divided into three parts,

the book first examines main concepts, principles, and methods of digital terrain modeling. It then looks at methods for analysis, modeling, and mapping of spatial distribution of soil properties using digital terrain analysis, before finally considering techniques for recognition, analysis, and interpretation of topographically manifested geological features. Digital Terrain Analysis in Soil Science and Geology, Second Edition, is an updated and revised edition, providing both a theoretical and methodological basis for understanding and applying geographical modeling techniques. Presents an integrated and unified view of digital terrain analysis in both soil science and geology Features research on new advances in the field, including DEM analytical approximation, analytical calculation of local morphometric variables, morphometric globes, and two-dimensional generalized spectral analytical methods Includes a rigorous description of the mathematical principles of digital terrain analysis Provides both a theoretical and methodological basis for understanding and applying geographical modeling

Quantitative Structural Geology - David D. Pollard 2020-07-23
A pioneering single-semester undergraduate textbook that balances descriptive and quantitative analysis of geological structures.

Spatial Point Patterns - Adrian Baddeley 2015-11-11
Modern Statistical Methodology and Software for Analyzing Spatial Point PatternsSpatial Point Patterns: Methodology and Applications with R shows scientific researchers and applied statisticians from a wide range of fields how to analyze their spatial point pattern data. Making the techniques accessible to non-mathematicians, the authors draw on th

Handbook of Geomathematics - Amir Z. Averbuch 2011