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Including case studies, this collection of engaging and stimulating essays written by a diverse group of scholars, scientists and writers examines the phenomenon of pseudoarchaeology from a variety of perspectives.

This book provides a self-study program on how mathematics, computer science and science can be usefully and seamlessly intertwined. Learning to use ideas from mathematics and computation is essential for understanding approaches to cognitive and biological science. As such the book covers calculus on one variable and two variables and works through a number of interesting first-order ODE models. It clearly uses MatLab in computational exercises where the models cannot be solved by hand, and also helps readers to understand that approximations cause errors – a fact that must always be kept in mind.

This is a text on quantum mechanics formulated simultaneously in terms of position and momentum, i.e. in phase space. It is written at an introductory level, drawing on the remarkable history of the subject for inspiration and motivation. Wigner functions density matrices in a special Weyl representation and star products are the cornerstones of the formalism. The resulting framework is a rich source of physical intuition. It has been used to describe transport in quantum optics, structure and dynamics in nuclear physics, chaos, and decoherence in quantum computing. It is also of importance in signal processing and the mathematics of algebraic deformation. A remarkable aspect of its internal logic, pioneered by Groenewold and Moyal, has only emerged in the last quarter-century: it furnishes a third, alternative way to formulate and understand quantum mechanics, independent of the conventional Hilbert space or path integral approaches to the subject. In this logically complete and self-standing formulation, one need not choose sides between coordinate or momentum space variables. It works in full phase-space, accommodating the uncertainty principle; and it offers unique insights into the classical limit of quantum theory. The observables in this formulation are c-number functions in phase space instead of operators, with the same interpretation as their classical counterparts, only composed together in novel algebraic ways using star products. This treatise provides an introductory overview and supplementary material suitable for an advanced undergraduate or a beginning graduate course in quantum mechanics. The ultimate resource for designers, engineers, and analyst working with calculations of loads and stress.

This book focuses on the approximation of nonlinear equations using iterative methods. Nine contributions are presented on the construction and analysis of these methods, the coverage encompassing convergence, efficiency, robustness, dynamics, and applications. Many problems are stated in the form of nonlinear equations, using mathematical modeling. In particular, a wide range of problems in Applied Mathematics and in Engineering can be solved by finding the solutions

to these equations. The book reveals the importance of studying convergence aspects in iterative methods and shows that selection of the most efficient and robust iterative method for a given problem is crucial to guaranteeing a good approximation. A number of sample criteria for selecting the optimal method are presented, including those regarding the order of convergence, the computational cost, and the stability, including the dynamics. This book will appeal to researchers whose field of interest is related to nonlinear problems and equations, and their approximation.

This volume of Statistical Physics constitutes the second part of Statistical Physics (Springer Series in Solid-State Science, Vols. 30, 31) and is devoted to nonequilibrium theories of statistical mechanics. We start with an introduction to the stochastic treatment of Brownian motion and then proceed to general problems involved in deriving a physical process from an underlying more basic process. Relaxation from nonequilibrium to equilibrium states and the response of a system to an external disturbance form the central problems of nonequilibrium statistical mechanics. These problems are treated both phenomenologically and microscopically along the lines of recent developments. Emphasis is placed on fundamental concepts and methods rather than on applications which are too numerous to be treated exhaustively within the limited space of this volume. For information on the general aim of this book, the reader is referred to the Foreword. For further reading, the reader should consult the bibliographies, although these are not meant to be exhaustive.

Ever since 1911, the Solvay Conferences have shaped modern physics. The 23rd edition, chaired by 2004 Nobel Laureate David Gross, did not break with that tradition. It gathered most of the leading figures working on the central problem of reconciling Einstein's theory of gravity with quantum mechanics. These proceedings give a broad overview with unique insight into the most fundamental issues raised by this challenge for 21st century physics, by distinguished renowned scientists. The contributions cover: the status of quantum mechanics, spacetime singularities and breakdown of classical space and time, mathematical structures underlying the most promising attempts under current development, spacetime as an emergent concept, as well as cosmology and the cosmological constant puzzle. A historical overview of the Solvay conferences by historian of sciences Peter Galison opens the volume. In the Solvay tradition, the volume also includes the discussions among the participants ? many of which were quite lively and illustrate dramatically divergent points of view ? carefully edited and reproduced in full.

Advanced and Emerging Polybenzoxazine Science and Technology introduces advanced topics of benzoxazine resins and polybenzoxazines as presented through the collaboration of leading experts in the benzoxazine community, representing the authoritative introduction to the subjects. Broad topics covered include the recent development and improved understanding of the subjects, including low temperature cure, aerogels and carbon aerogels, smart chemistry in fire retarding materials and coatings, metal containing benzoxazines, rational design of advanced properties, and

materials from natural renew. In the past twenty years, the number of papers on polybenzoxazine has continuously increased at an exponential rate. During the past three years, the number of papers published is more than the previous 17 years combined. The material is now part of only a few successfully commercialized polymers in the past 35 years. Therefore, interest in this material in both academia and industry is very strong. Includes the latest advancements in benzoxazine chemistry Describes advanced materials, such as aerogels, carbons, smart coatings, nanofibers, and shape memory materials Includes additional characterization data and techniques, such as FT-IR, Raman, NMR, DSC, and TGA analyses

This textbook provides an introduction to numerical computing and its applications in science and engineering. The topics covered include those usually found in an introductory course, as well as those that arise in data analysis. This includes optimization and regression based methods using a singular value decomposition. The emphasis is on problem solving, and there are numerous exercises throughout the text concerning applications in engineering and science. The essential role of the mathematical theory underlying the methods is also considered, both for understanding how the method works, as well as how the error in the computation depends on the method being used. The MATLAB codes used to produce most of the figures and data tables in the text are available on the author's website and SpringerLink. Collins New GCSE Maths Homework Books are excellent companions to Collins New GCSE Maths Student Books. Following the familiar structure and layout of the Student Book, the Homework Book provides extensive practice of all the elements of the new curriculum at Grades G to C to ensure that your students achieve the best grades in mathematics. Collins New GCSE Maths EDEXCEL Linear Homework Book Foundation 1 is written by experienced teachers and examiners, and provides comprehensive practice for all the topics covered in Collins New GCSE Maths EDEXCEL Linear Student Book Foundation 1. It fully supports your students in learning the new 2010 GCSE Maths EDEXCEL specification and will ensure that they achieve the best grades: * Provide excellent additional practice for all topics covered in the Student Book with brand-new questions not found in the Student Book * Enable students to assess their own progress through each chapter with familiar colour-coded grades in every exercise * Extend students' thinking and problem-solving skills with open-ended investigative tasks at the end of every chapter * Assess students' work with answers to homework questions conveniently located in Collins New GCSE Maths [EDEXCEL Linear Teacher's Pack Foundation 1 * Give students easy reference to the clear explanations and examples in their textbooks with a free CD-ROM of Collins New GCSE Maths EDEXCEL Linear Student Book Foundation 1 with every Homework Book

A wide range of topics in partial differential equations, complex analysis, and mathematical physics are presented to commemorate the memory of the great French mathematician Jean Leray. The 17 research articles are written by some

of the world's leading mathematicians who explore important current subjects. Most articles contain complete proofs and excellent bibliographies. For graduate students and mathematical physicists as well as mathematicians in analysis and PDEs.

Included in this massive compendium are listings of the properties of approximately 4,000 organic and 1,400 inorganic compounds. Enhanced by nearly 300 illustrations, including new and updated tabular data, the latest edition of this bestselling resource will continue to be the working tool more chemists turn to for the facts, formulas, and other data needed to solve the full range of problems in the discipline. 290 illus.

This proceedings volume covers research in key areas of applied mathematical analysis, and gathers works presented at the international conference "Concord-90," in honor of the 90th birthday of Professor Constantin Corduneanu (1928-2018). The event – which Professor Corduneanu was able to attend – was held at Ural Federal University in Ekaterinburg, Russia, on July 26-28, 2018. Professor Corduneanu's research in mathematical analysis spanned nearly seven decades and explored a range of important issues in the field, including studies of global existence, stability problems, and oscillation theory, with special emphasis on various classes of nonlinear equations. He published over two hundred articles and several books, including "Almost Periodic Oscillations and Waves" (Springer, 2009). In this volume the reader will find selected, peer-reviewed articles from seven fields of research – Differential Equations, Optimal Control and Stabilization; Stochastic Methods; Topology and Functions Approximation; Mathematical Biology and Bioinformatics; Mathematical Modeling in Mining; Mathematical Modeling in Economics; and Computer Science and Image Processing – which honor and reflect Professor Corduneanu's legacy in the fields of oscillation, stability and control theory.

The principal focus of this volume is to illustrate the level of accuracy currently achievable by ab initio quantum chemical calculations. While new developments in theory are discussed to some extent, the major emphasis is on a comparison of calculated properties with experiment. This focus is similar to the one taken in a book, Comparison of Ab Initio Quantum Chemistry with Experiment for Small Molecules, edited by Rodney Bartlett (Reidel, 1984). However, the phenomenal improvement in both theoretical methods and computer architecture have made it possible to obtain accurate results for rather large molecular systems. This is perhaps best illustrated in this volume by the chapter entitled 'Spectroscopy of Large Organic Molecules' by Bjorn Roos and coworkers. For example, the electronic spectra of the nucleic acid base monomer structures shown on the front cover have been obtained using a fully correlated ab initio study. For researchers, teachers and students in chemistry and physics.

A comprehensive and example oriented text for the study of chemical process design and simulation Chemical Process Design and Simulation is an accessible guide that offers information on the most important principles of chemical

engineering design and includes illustrative examples of their application that uses simulation software. A comprehensive and practical resource, the text uses both Aspen Plus and Aspen Hysys simulation software. The author describes the basic methodologies for computer aided design and offers a description of the basic steps of process simulation in Aspen Plus and Aspen Hysys. The text reviews the design and simulation of individual simple unit operations that includes a mathematical model of each unit operation such as reactors, separators, and heat exchangers. The author also explores the design of new plants and simulation of existing plants where conventional chemicals and material mixtures with measurable compositions are used. In addition, to aid in comprehension, solutions to examples of real problems are included. The final section covers plant design and simulation of processes using nonconventional components. This important resource: Includes information on the application of both the Aspen Plus and Aspen Hysys software that enables a comparison of the two software systems Combines the basic theoretical principles of chemical process and design with real-world examples Covers both processes with conventional organic chemicals and processes with more complex materials such as solids, oil blends, polymers and electrolytes Presents examples that are solved using a new version of Aspen software, ASPEN One 9 Written for students and academics in the field of process design, Chemical Process Design and Simulation is a practical and accessible guide to the chemical process design and simulation using proven software.

This book is a practical guide to optical, optoelectronic, and semiconductor materials and provides an overview of the topic from its fundamentals to cutting-edge processing routes to groundbreaking technologies for the most recent applications. The book details the characterization and properties of these materials. Chemical methods of synthesis are emphasized by the authors throughout the publication. Describes new materials and updates to older materials that exhibit optical, optoelectronic and semiconductor behaviors; Covers the structural and mechanical aspects of the optical, optoelectronic and semiconductor materials for meeting mechanical property and safety requirements; Includes discussion of the environmental and sustainability issues regarding optical, optoelectronic, and semiconductor materials, from processing to recycling.

Hyperbolic Manifolds and Discrete Groups is at the crossroads of several branches of mathematics: hyperbolic geometry, discrete groups, 3-dimensional topology, geometric group theory, and complex analysis. The main focus throughout the text is on the "Big Monster," i.e., on Thurston's hyperbolization theorem, which has not only completely changes the landscape of 3-dimensional topology and Kleinian group theory but is one of the central results of 3-dimensional topology. The book is fairly self-contained, replete with beautiful illustrations, a rich set of examples of key concepts, numerous exercises, and an extensive bibliography and index. It should serve as an ideal graduate course/seminar text or as a comprehensive reference.

Beginning with an introduction to carbon-based nanomaterials, their electronic properties, and general concepts in quantum transport, this

detailed primer describes the most effective theoretical and computational methods and tools for simulating the electronic structure and transport properties of graphene-based systems. Transport concepts are clearly presented through simple models, enabling comparison with analytical treatments, and multiscale quantum transport methodologies are introduced and developed in a straightforward way, demonstrating a range of methods for tackling the modelling of defects and impurities in more complex graphene-based materials. The authors also discuss the practical applications of this revolutionary nanomaterial, contemporary challenges in theory and simulation, and long-term perspectives. Containing numerous problems for solution, real-life examples of current research, and accompanied online by further exercises, solutions and computational codes, this is the perfect introductory resource for graduate students and researchers in nanoscience and nanotechnology, condensed matter physics, materials science and nanoelectronics.

Probability and Mathematical Statistics: A Series of Monographs and Textbooks: Random Polynomials focuses on a comprehensive treatment of random algebraic, orthogonal, and trigonometric polynomials. The publication first offers information on the basic definitions and properties of random algebraic polynomials and random matrices. Discussions focus on Newton's formula for random algebraic polynomials, random characteristic polynomials, measurability of the zeros of a random algebraic polynomial, and random power series and random algebraic polynomials. The text then elaborates on the number and expected number of real zeros of random algebraic polynomials; number and expected number of real zeros of other random polynomials; and variance of the number of real zeros of random algebraic polynomials. Topics include the expected number of real zeros of random orthogonal polynomials and the number and expected number of real zeros of trigonometric polynomials. The book takes a look at convergence and limit theorems for random polynomials and distribution of the zeros of random algebraic polynomials, including limit theorems for random algebraic polynomials and random companion matrices and distribution of the zeros of random algebraic polynomials. The publication is a dependable reference for probabilists, statisticians, physicists, engineers, and economists.

Automatic generation control (AGC) is one of the most important control problems in the design and operation of interconnected power systems. Its significance continues to grow as a result of several factors: the changing structure and increasing size, complexity, and functionality of power systems, the rapid emergence (and uncertainty) of renewable energy sources, developments in power generation/consumption technologies, and environmental constraints. Delving into the fundamentals of power system AGC, Intelligent Automatic Generation Control explores ways to make the infrastructures of tomorrow smarter and more flexible. These frameworks must be able to handle complex multi-objective regulation optimization problems, and they must be highly diversified in terms of policies, control strategies, and wide distribution in demand and supply sources—all via an intelligent scheme. The core of such intelligent systems should be based on efficient, adaptable algorithms, advanced information technology, and fast communication devices to ensure that the AGC systems can maintain generation-load balance following serious disturbances. This book addresses several new schemes using intelligent control techniques for simultaneous minimization of system frequency deviation and tie-line power changes, which is required for successful operation of interconnected power systems. It also concentrates on physical and engineering aspects and examines several developed control strategies using real-time simulations. This reference will prove useful for engineers and operators in power system planning and operation, as well as academic researchers and students in field of electrical engineering.

Basic Mathematics and Statistics for Science is a low-level introduction to the essential techniques students need to understand. It assumes little prior knowledge, and adopts a gentle approach that leads through examples in the book and website. No other text provides this range

of educational support for science students. The integration between book and website provides study options that would be impossible through a book alone, and allows students to study in ways that suit their own circumstances and preferences. The combination of book and website also provides ready-prepared material for lectures, tutorials and computer practicals. Tutors can use the material to develop a variety of coherent programme using different learning styles. The book develops the mathematics and statistics through examples and questions that reflect the scientific context, and has succeeded in being relevant to a range of undergraduate science programmes.

In the past ten years, heteroepitaxy has continued to increase in importance with the explosive growth of the electronics industry and the development of a myriad of heteroepitaxial devices for solid state lighting, green energy, displays, communications, and digital computing. Our ever-growing understanding of the basic physics and chemistry underlying heteroepitaxy, especially lattice relaxation and dislocation dynamic, has enabled an ever-increasing emphasis on metamorphic devices. To reflect this focus, two all-new chapters have been included in this new edition. One chapter addresses metamorphic buffer layers, and the other covers metamorphic devices. The remaining seven chapters have been revised extensively with new material on crystal symmetry and relationships, III-nitride materials, lattice relaxation physics and models, in-situ characterization, and reciprocal space maps.

In August 2003, ETHZ Computational Laboratory (CoLab), together with the Swiss Center for Scientific Computing in Manno and the Universit della Svizzera Italiana (USI), organized the Summer School in "Multiscale Modelling and Simulation" in Lugano, Switzerland. This summer school brought together experts in different disciplines to exchange ideas on how to link methodologies on different scales. Relevant examples of practical interest include: structural analysis of materials, flow through porous media, turbulent transport in high Reynolds number flows, large-scale molecular dynamic simulations, ab-initio physics and chemistry, and a multitude of others. Though multiple scale models are not new, the topic has recently taken on a new sense of urgency. A number of hybrid approaches are now created in which ideas coming from distinct disciplines or modelling approaches are unified to produce new and computationally efficient techniques.

This book comprises high-quality refereed research papers presented at the Third International Conference on Computer Science, Engineering and Education Applications (ICCSEEA2020), held in Kyiv, Ukraine, on 21–22 January 2020, organized jointly by National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", National Aviation University, and the International Research Association of Modern Education and Computer Science. The topics discussed in the book include state-of-the-art papers in computer science, artificial intelligence, engineering techniques, genetic coding systems, deep learning with its medical applications, and knowledge representation with its applications in education. It is an excellent source of references for researchers, graduate students, engineers, management practitioners, and undergraduate students interested in computer science and their applications in engineering and education. The shelf-life of a product is critical in determining both its quality and profitability. This important collection reviews the key factors in determining shelf-life and how it can be measured. Part one examines the factors affecting shelf-life and spoilage, including individual chapters on the major types of food spoilage, the role of moisture and temperature, spoilage yeasts, the Maillard reaction and the factors underlying lipid oxidation. Part two addresses the best ways of measuring the shelf-life of foods, with chapters on modelling food spoilage, measuring and modelling glass transition, detecting spoilage yeasts, measuring lipid oxidation, the design and validation of shelf-life tests and the use of accelerated shelf-life tests. Understanding and measuring the shelf-life of food is an important reference for all those concerned with extending the shelf-life of food. Reviews the key factors in determining shelf-life and how they can be measured Examines the importance of the shelf-life of a product in determining its quality and profitability Brings together the leading international experts in the field

Image algebra is a comprehensive, unifying theory of image transformations, image analysis, and image understanding. In 1996, the bestselling first edition of the Handbook of Computer Vision Algorithms in Image Algebra introduced engineers, scientists, and students to this powerful tool, its basic concepts, and its use in the concise representation of computer vision algorithms. Updated to reflect recent developments and advances, the second edition continues to provide an outstanding introduction to image algebra. It describes more than 80 fundamental computer vision techniques and introduces the portable iaC++ library, which supports image algebra programming in the C++ language. Revisions to the first edition include a new chapter on geometric manipulation and spatial transformation, several additional algorithms, and the addition of exercises to each chapter. The authors—both instrumental in the groundbreaking development of image algebra—introduce each technique with a brief discussion of its purpose and methodology, then provide its precise mathematical formulation. In addition to furnishing the simple yet powerful utility of image algebra, the Handbook of Computer Vision Algorithms in Image Algebra supplies the core of knowledge all computer vision practitioners need. It offers a more practical, less esoteric presentation than those found in research publications that will soon earn it a prime location on your reference shelf.

This edited, multi-author book gathers selected, peer-reviewed contributions based on papers presented at the 23rd International Workshop on Quantum Systems in Chemistry, Physics, and Biology (QSCP-XXIII), held in Mopani Camp, The Kruger National Park, South Africa, in September 2018. The content is primarily intended for scholars, researchers, and graduate students working at universities and scientific institutes who are interested in the structure, properties, dynamics, and spectroscopy of atoms, molecules, biological systems, and condensed matter.

Essential Mathematics and Statistics for ScienceWiley

Please note this title is suitable for any student studying: Exam Board: AQA Level: GCSE Subject: Mathematics First teaching: September 2015 First exams: June 2017 AQA GCSE Maths, Higher Student Book has been approved by AQA and specially written by a team of maths experts for the Higher tier of AQA's 2015 GCSE specification. Designed to fully support the new style of assessment, the book adopts a clear style to focus on delivering exam success via the careful development of fluency and problem solving practice. Powered by MyMaths the book links directly to the ever popular web site offering students a further source of appropriate support.

Still the number one resource for designers in the field, the Third Edition of this classic Handbook is extensively revised and updated to reflect the enormous recent advances in electronic filter design... while maintaining the overall emphasis on practical

This book offers a self-study program on how mathematics, computer science and science can be profitably and seamlessly intertwined. This book focuses on two variable ODE models, both linear and nonlinear, and highlights theoretical and computational tools using MATLAB to explain their solutions. It also shows how to solve cable models using separation of variables and the Fourier Series.

?Current Trends in Biomanufacturing focuses on cutting-edge research regarding the design, fabrication, assembly, and measurement of bio-elements into structures, devices, and systems. The field of biomaterial and biomanufacturing is growing exponentially in order to meet the increasing demands of for artificial joints, organs and bone-fixation devices. Rapid advances in the biological sciences and engineering are leading to newer and viable resources, methods and techniques that may providing better quality of life and more affordable health care services. The book covers the broad aspects of biomanufacturing, including: synthesis of biomaterials; implant coating techniques; spark plasma sintering; microwave processing; and cladding, powder metallurgy and electrospinning. The contributors illustrate the recent trends of biomanufacturing, highlighting the important aspects of biomaterial synthesis, and their use as feedstock of fabrication technologies and their

characterization, along with their clinical practices. Current Trends in Biomanufacturing updates researchers and scientists the novelties and techniques of the field, as it summarises numerous aspects of biomanufacturing, including synthesis of biomaterials, fabrication of biomedical structures, their in-vivo/ in-vitro, mechanical analysis and associated ISO standards.

Easing the transition from GCSE to AS level, this textbook meets the 2004 Edexcel specifications and provides numerous worked examples and solutions to aid understanding of key concepts.

Wigner's quasi-probability distribution function in phase space is a special (Weyl) representation of the density matrix. It has been useful in describing quantum transport in quantum optics; nuclear physics; decoherence, quantum computing, and quantum chaos. It is also important in signal processing and the mathematics of algebraic deformation. A remarkable aspect of its internal logic, pioneered by Groenewold and Moyal, has only emerged in the last quarter-century: it furnishes a third, alternative, formulation of quantum mechanics, independent of the conventional Hilbert space, or path integral formulations. In this logically complete and self-standing formulation, one need not choose sides ? coordinate or momentum space. It works in full phase space, accommodating the uncertainty principle, and it offers unique insights into the classical limit of quantum theory. This invaluable book is a collection of the seminal papers on the formulation, with an introductory overview which provides a trail map for those papers; an extensive bibliography; and simple illustrations, suitable for applications to a broad range of physics problems. It can provide supplementary material for a beginning graduate course in quantum mechanics.

Cambridge preliminary mathematics general second edition has been completely revised for the stage 6 mathematics general syllabus implement from 2013, to prepare you for the HSC general 1 or general 2 course.

The field of isotope effects has expanded exponentially in the last decade, and researchers are finding isotopes increasingly useful in their studies. Bringing literature on the subject up to date, Isotope Effects in Chemistry and Biology covers current principles, methods, and a broad range of applications of isotope effects in the physical, biolo

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