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Transcendental Representations with Applications to Solids and Fluids Applications of the Isotopic Effect in Solids Applications of Group Theory to Atoms, Molecules, and Solids Crystal Engineering: The Design and Application of Functional Solids Applications of Group Theory to Atoms, Molecules, and Solids The Finite Element Method for Mechanics of Solids with ANSYS Applications Part I: Application of the Theory of Perfectly Plastic Solids to the Stress-analysis in Strain-hardening Solids Multinuclear Magnetic Resonance in Liquids and Solids — Chemical Applications Application of Liquid-layer Solid-sample Spark Technique to Spectrochemical Spark Source Charge Transport in Disordered Solids with Applications in Electronics A treatise on the application of analysis to solid geometry, commenced by D.F. Gregory, concluded by W. Walton Mechanics of Solids with Applications to Thin Bodies SOLID MECHANICS FOR MATERIALS ENGINEERS -- Principles and Applications of Mesomechanics The

Application of Microwave Technology to Solids Analysis Organic Molecular Solids Viscoelastic Solids (1998) Applications of Tensor Functions in Solid Mechanics Transcendental Representations with Applications to Solids and Fluids Physics of Spin in Solids: Materials, Methods and Applications The development and application of a solid state magnetically supported ultracentrifuge system for use in evaluation of deposited films IUTAM Symposium on Advanced Optical Methods and Applications in Solid Mechanics Mathematical Modelling of Solids with Nonregular Boundaries Mechanics of Solids Progress in Electron Properties of Solids Dynamical Properties of Solids Soft X-ray Emission Studies of Solids at PF Solid Lubrication Fundamentals and Applications Solid State Electrochemistry and its Applications to Sensors and Electronic Devices Solid Electrolytes for Advanced Applications EPR of Free Radicals in Solids I Solid State Lasers Materials, Technologies and Applications Solid State Physics Fundamentals of Shock Wave Propagation in Solids Biophysical Applications of Solid State and Tritium NMR Experimental Mechanics of Solids Applications of the Isotopic Effect in Solids Liquid Nitrogen Fertilizers for Direct Application Nonlinear Spectroscopy of Solids Applications of Percolation Theory to Modeling of Noncatalytic Gas-solid Reactions Applications of the M ö ssbauer Effect in Chemistry and

Solid-state Physics

Most recent publications on spin-related phenomena focus on technological aspects of spin-dependent transport, with emphasis on the specific needs of spintronics. The present publication targets rather fundamental problems related to the physics of spin in solids, such as: (1) manifestation of spin and orbital polarization in spectroscopy, including valence and X-ray photoemission, magneto-optics, low-energy electron scattering on the surface; (2) application of new methods for interpretation and determination of magnetic low-lying excitations in the bulk and on the surface; (3) recent progress in evaluation of different type of magnetic forces including spin-orbit and exchange interaction, with subsequent determination of anisotropy and spin-ordering structure; (4) general problems of spin-dependent transport in semiconductors and metals, such as current-caused torque effect on spins at interfaces and spin injection in quantum dot systems; (5) problems in understanding the spin-dependent trends in unconventional superconductors; (6) many-body problems in solid state physics and recent progress in evaluation of self-energy effects; (7) fabrication of new magnetic materials with pre-programmed properties based on assembly from nano-particles, etc. Solid Lubrication Fundamentals and Applications description

of the adhesion, friction, abrasion, and wear behavior of solid film lubricants and related tribological materials, including diamond and diamond-like solid films. The book details the properties of solid surfaces, clean surfaces, and contaminated surfaces as well as discussing the structu The field of charge conduction in disordered materials is a rapidly evolving area owing to current and potential applications of these materials in various electronic devices This text aims to cover conduction in disordered solids from fundamental physical principles and theories, through practical material development with an emphasis on applications in all areas of electronic materials. International group of contributors Presents basic physical concepts developed in this field in recent years in a uniform manner Brings up-to-date, in a one-stop source, a key evolving area in the field of electronic materials Solid State Physics provides a broad introduction to some of the principal areas of the physical phenomena in solid materials and is aimed broadly at undergraduate students of physics and engineering related subjects. The physical properties of materials are intimately related to the crystalline symmetry of atoms as well as the atomic species present. This includes the electronic, mechanical, magnetic and optical properties of all materials. These subjects are treated in depth and provide the reader with the tools necessary for an

understanding of the varied phenomena of materials. Particular emphasis is given to the reaction of materials to specific stimuli, such as the application of electric and magnetic fields. Nanotechnologies are based on the formation of nano-sized elements and structures. The final chapter of the book provides a broad introduction to the topic and uses some of the main tools of solid state physics to explain the behavior of nanomaterials and why they are of importance for future technologies. FEATURES: • Provides a broad introduction to the principal areas of the physical phenomena in solid materials • Includes the electronic, mechanical, magnetic and optical properties of all materials • Explains the behavior of nanomaterials and why they are of importance for future technologies Crystal engineers need an understanding of bonding theory, computational chemistry, applied spectroscopy, structural methods, synthesis strategies, and applications of custom-designed solids. This book contains chapters on all these topics, written by internationally recognized experts, plus contributions from leading researchers in the field. Based on the author's lecture notes for a course on Physical Chemistry of Oxides at High Temperatures held at the Graduate School of the Tokyo Institute of Technology, this book examines the micromechanism of migration of ions and electronic defects contained in solid and liquid oxides at high

temperature. The book is primarily designed for use as a graduate-level text and includes 150 problems for students. The emphasis is on introduction of simple theories for transport properties of oxides, which can be universally used at low and high temperatures, for various combinations of oxides. EPR of Free Radicals in Solids: Trends in Methods and Applications, 2nd ed. presents a critical two volume review of the methods and applications of EPR (ESR) for the study of free radical processes in solids. Emphasis is on the progress made in the developments in EPR technology, in the application of sophisticated matrix isolation techniques and in the advancement in quantitative EPR that have occurred since the 1st edition was published. Improvements have been made also at theoretical level, with the development of methods based on first principles and their application to the calculation of magnetic properties as well as in spectral simulations. EPR of Free Radicals in Solids I focuses on the trends in experimental and theoretical methods to extract structural and dynamical properties of radicals and spin probes in solid matrices by continuous wave (CW) and pulsed techniques. It presents simulation techniques and software for CW and pulsed EPR as well as studies of quantum effects at low temperature. The chapters dealing with quantum chemistry methods for the theoretical interpretation of hyperfine coupling tensors

and g-tensors have been much extended in this edition and a new chapter on the calculation of zero-field splitting tensors has been added. This new edition is a valuable resource to experimentalists and theoreticians in research involving free radicals, as well as for students of advanced courses in physical chemistry, chemical physics, materials science, biophysics, biochemistry and related fields. This new edition is a valuable resource to experimentalists and theoreticians in research involving free radicals, as well as for students of advanced courses in physical chemistry, chemical physics, materials science, biophysics, biochemistry and related fields. The idea of this NATO school was born during philosophical discussions with Dr Brevard on the present and future of NMR during a night walk under the palm trees in Biskra during a seminar held in this oasis. It was clear for us that the recent progress in the field of NMR, especially inverse spectroscopy and the development of MAS, was opening new perspectives for chemists. We realised also that organometallic and inorganic chemists were not clearly informed about the potentialities of all the new methods. NA TO, with its summer schools, was offering a good opportunity to propose to the chemical community a session where those problems would be largely developped. This School is then the prolongation of the two previous ones: Palermo in 1976 on "the less

receptive nuclei" and Stirling in 1982 on "the multinuclear approach to NMR spectroscopy" . It was divided into two sub-sessions: NMR in the liquid state and NMR in the solid state. This is reflected in the book organization. As indicated by the title of this School, we were mainly concerned with the methodological aspects of multinuclear NMR. If many examples are given, they appear only as a support for the understanding of the theory or in explanation of some practical aspects of the different experiments. Each domain is introduced by a lecture which presents selected examples. Viscoelastic Solids covers the mathematical theory of viscoelasticity and physical insights, causal mechanisms, and practical applications. The book: presents a development of the theory, addressing both transient and dynamic aspects as well as emphasizing linear viscoelasticity synthesizes the structure of the theory with the aim of developing physical insight illustrates the methods for the solution of stress analysis problems in viscoelastic objects explores experimental methods for the characterization of viscoelastic materials describes the phenomenology of viscoelasticity in a variety of materials, including polymers, metals, high damping alloys, rock, piezoelectric materials, cellular solids, dense composite materials, and biological materials analyzes high damping and extremely low damping provides the theory of viscoelastic composite materials, including examples

of various types of structure and the relationships between structure and mechanical properties contains examples on the use of viscoelastic materials in preventing and alleviating human suffering Viscoelastic Solids also demonstrates the use of viscoelasticity for diverse applications, such as earplugs, gaskets, computer disks, satellite stability, medical diagnosis, injury prevention, vibration abatement, tire performance, sports, spacecraft explosions, and music. This book is a printed edition of the Special Issue "Solid State Lasers Materials, Technologies and Applications" that was published in Applied Sciences This book highlights the state of the art in solid electrolytes, with particular emphasis on lithium garnets, electrolyte-electrode interfaces and all-solid-state batteries based on lithium garnets. Written by an international group of renowned experts, the book addresses how garnet-type solid electrolytes are contributing to the development of safe high energy density Li batteries. Unlike the flammable organic liquid electrolyte used in existing rechargeable Li batteries, garnet-type solid electrolytes are intrinsically chemically stable in contact with metallic lithium and potential positive electrodes, while offering reasonable Li conductivity. The book's respective chapters cover a broad spectrum of topics related to solid electrolytes, including interfacial engineering to resolve the electrolyte-electrode interfaces, the latest developments in the

processing of thin and ultrathin lithium garnet membranes, and fabrication strategies for the high-performance solid-state batteries.This highly informative and intriguing book will appeal to postgraduate students and researchers at academic and industrial laboratories with an interest in the advancement of high energy-density lithium metal batteries This book follows a model of modern pedagogy. It is interdisciplinary and uses specific examples to teach general principles. This text is organized into three main sections. The first section reviews aspects of solid mechanics, with topics normally covered in standard materials courses but also dealing with purer mechanics concepts of relevance in materials science. The second section deals with analytical and computational ideas. The third section is called Experimental Method though it is really a series of examples based on Prof. Prawoto's personal experience. This type of presentation- the use of particular examples to demonstrate broader concepts - is powerful. An applications-oriented approach gives graduate students and researchers in the physical sciences the tools needed to analyze any physical system. Mathematical Modelling of Solids with Nonregular Boundaries demonstrates the use of asymptotic methods and other analytical techniques for investigating problems in solid mechanics. Applications to solids with nonregular boundaries are described in

detail, providing precise and rigorous treatment of current methods and techniques. The book addresses problems in fracture mechanics of inhomogeneous media and illustrates applications in strength analysis and in geophysics. The rigorous approach allows the reader to explicitly analyze the stress-strain state in continuous media with cavities or inclusions, in composite materials with small defects, and in elastic solids with sharp inclusions. Effective asymptotic procedures for eigenvalue problems in domains with small defects are clearly outlined, and methods for analyzing singularly perturbed boundary value problems are examined. Introductory material is provided in the first chapter of Mathematical Modelling of Solids with Nonregular Boundaries, which presents a survey of relevant and necessary information, including equations of linear elasticity and formulations of the boundary value problems. Background information - in the form of definitions and general solutions - is also provided on elasticity problems in various bounded and unbounded domains. This book is an excellent resource for students, applied scientists, and engineers. Interest in organic molecular solids extends to a range of fields including chemistry, physics, electrical engineering, and materials science. In chemistry, it applies to such topics as solid state reactivity, crystal engineering, theoretical approaches to crystal structure determination, and

morphology control. In physics, electrical engineering, and materials science, the possibility of producing organic-based materials (such as crystals, polymers, thin films, or liquid crystals) with potential electronic, opto-electronic, and magnetic uses is a major area of current research interest throughout the world. Organic Molecular Solids examines the uses of organic-based materials over a wide range of applications and interests. Each chapter surveys a relevant topic, providing appropriate introductory background information and modern developments. "Computer assisted problem supplement to accompany" book. While the finite element method (FEM) has become the standard technique used to solve static and dynamic problems associated with structures and machines, ANSYS software has developed into the engineer's software of choice to model and numerically solve those problems. An invaluable tool to help engineers master and optimize analysis, The Finite Element Method for Mechanics of Solids with ANSYS Applications explains the foundations of FEM in detail, enabling engineers to use it properly to analyze stress and interpret the output of a finite element computer program such as ANSYS. Illustrating presented theory with a wealth of practical examples, this book covers topics including: Essential background on solid mechanics (including small- and large-deformation elasticity, plasticity, and

viscoelasticity) and mathematics Advanced finite element theory and associated fundamentals, with examples Use of ANSYS to derive solutions for problems that deal with vibration, wave propagation, fracture mechanics, plates and shells, and contact Totally self-contained, this text presents step-by-step instructions on how to use ANSYS Parametric Design Language (APDL) and the ANSYS Workbench to solve problems involving static/dynamic structural analysis (both linear and non-linear) and heat transfer, among other areas. It will quickly become a welcome addition to any engineering library, equally useful to students and experienced engineers alike. Experimental solid mechanics is the study of materials to determine their physical properties. This study might include performing a stress analysis or measuring the extent of displacement, shape, strain and stress which a material suffers under controlled conditions. In the last few years there have been remarkable developments in experimental techniques that measure shape, displacement and strains and these sorts of experiments are increasingly conducted using computational techniques. Experimental Mechanics of Solids is a comprehensive introduction to the topics, technologies and methods of experimental mechanics of solids. It begins by establishing the fundamentals of continuum mechanics, explaining key areas such as the equations

used, stresses and strains, and two and three dimensional problems. Having laid down the foundations of the topic, the book then moves on to look at specific techniques and technologies with emphasis on the most recent developments such as optics and image processing. Most of the current computational methods, as well as practical ones, are included to ensure that the book provides information essential to the reader in practical or research applications. Key features: Presents widely used and accepted methodologies that are based on research and development work of the lead author Systematically works through the topics and theories of experimental mechanics including detailed treatments of the Moire, Speckle and holographic optical methods Includes illustrations and diagrams to illuminate the topic clearly for the reader Provides a comprehensive introduction to the topic, and also acts as a quick reference guide This comprehensive book forms an invaluable resource for graduate students and is also a point of reference for researchers and practitioners in structural and materials engineering. This report presents an account of the course "Nonlinear Spectroscopy of Solids: Advances and Applications" held in Erice, Italy, from June 16 to 30, 1993. This meeting was organized by the International School of Atomic and Molecular Spectroscopy of the "Ettore Majorana" Centre for Scientific Culture. The purpose of

this course was to present and discuss physical models, mathematical formalisms, experimental techniques, and applications relevant to the subject of nonlinear spectroscopy of solid state materials. The universal availability and application of lasers in spectroscopy has led to the widespread observation of nonlinear effects in the spectroscopy of materials. Nonlinear spectroscopy encompasses many physical phenomena which have their origin in the monochromaticity, spectral brightness, coherence, power density and tunability of laser sources. Conventional spectroscopy assumes a linear dependence between the applied electromagnetic field and the induced polarization of atoms and molecules. The validity of this assumption rests on the fact that even the most powerful conventional sources of light produce a light intensity which is not strong enough to equalize the rate of stimulated emission and that of the experimentally observed decay. A different situation may arise when laser light sources are used, particularly pulsed lasers. The use of such light sources can make the probability of induced emission comparable to, or even greater than, the probability of the observed decay; in such cases the nonlinearity of the response of the system is revealed by the experimental data and new properties, not detectable by conventional spectroscopy, will emerge. Building on the author’s previous book in the series, Complex Analysis with Applications to Flows

and Fields (CRC Press, 2010), Transcendental Representations with Applications to Solids and Fluids focuses on four infinite representations: series expansions, series of fractions for meromorphic functions, infinite products for functions with infinitely many zeros, and continued fractions as alternative representations. This book also continues the application of complex functions to more classes of fields, including incompressible rotational flows, compressible irrotational flows, unsteady flows, rotating flows, surface tension and capillarity, deflection of membranes under load, torsion of rods by torques, plane elasticity, and plane viscous flows. The two books together offer a complete treatment of complex analysis, showing how the elementary transcendental functions and other complex functions are applied to fluid and solid media and force fields mainly in two dimensions. The mathematical developments appear in odd-numbered chapters while the physical and engineering applications can be found in even-numbered chapters. The last chapter presents a set of detailed examples. Each chapter begins with an introduction and concludes with related topics. Written by one of the foremost authorities in aeronautical/aerospace engineering, this self-contained book gives the necessary mathematical background and physical principles to build models for technological and scientific purposes. It shows how to formulate problems,

justify the solutions, and interpret the results. This volume on the novelties in the electronic properties of solids appears in occasion of Franco Bassani sixtieth birthday, and is dedicated to honour a scientific activity which has contributed so much of the development of this very active area of research. It is re markable that this book can cover so large a part of the current research on electronic properties of solids by contributions from Bassani's former students, collaborators at different stages of his scientific life, and physicists from all over the world who have been in close scientific relationship with him. A personal flavour therefore accompanies a number of the papers of this volume, which are both up-to-date reports on present research and original recollections of the early events of modern solid state physics. The volume begins with a few contributions dealing with theoretical procedures for electronic energy levels, a primary step toward the interpretation of structural and optical properties of extended and confined systems. Other papers concern the interacting state of electrons with light (polaritons) and the effect of the coupling of electrons with lattice vibrations, with emphasis on the thermal behaviour of the electron levels and on such experimental procedures as piezospectroscopy. Electron-lattice interaction in external magnetic field and transport-related properties due to high light excitation are also con sidered. The

impact of synchroton radiation on condensed matter spectroscopy is dis cussed in a topical contribution, and optical measurements are presented for extended and impurity levels. My intent in writing this book is to present an introduction to the thermo- chanical theory required to conduct research and pursue applications of shock physics in solid materials. Emphasis is on the range of moderate compression that can be produced by high-velocity impact or detonation of chemical exp- sives and in which elastoplastic responses are observed and simple equations of state are applicable. In the interest of simplicity, the presentation is restricted to plane waves producing uniaxial deformation. Although applications often - volve complex multidimensional deformation fields it is necessary to begin with the simpler case. This is also the most important case because it is the usual setting of experimental research. The presentation is also restricted to theories of material response that are simple enough to permit illustrative problems to be solved with minimal recourse to numerical analysis. The discussions are set in the context of established continuum-mechanical principles. I have endeavored to define the quantities encountered with some care and to provide equations in several convenient forms and in a way that lends itself to easy reference. Thermodynamic analysis plays an important role in continuum mechanics, and I have included a

presentation of aspects of this subject that are particularly relevant to shock physics. The notation adopted is that conventional in expositions of modern continuum mechanics, insofar as possible, and variables are explained as they are encountered. Those experienced in shock physics may find some of the notation unconventional. Building on the author's previous book in the series, Complex Analysis with Applications to Flows and Fields (CRC Press, 2010), Transcendental Representations with Applications to Solids and Fluids focuses on four infinite representations: series expansions, series of fractions for meromorphic functions, infinite products for functions with infinitely many zeros, and continued fractions as alternative representations. This book also continues the application of complex functions to more classes of fields, including incompressible rotational flows, compressible irrotational flows, unsteady flows, rotating flows, surface tension and capillarity, deflection of membranes under load, torsion of rods by torques, plane elasticity, and plane viscous flows. The two books together offer a complete treatment of complex analysis, showing how the elementary transcendental functions and other complex functions are applied to fluid and solid media and force fields mainly in two dimensions. The mathematical developments appear in odd-numbered chapters while the physical and engineering

applications can be found in even-numbered chapters. The last chapter presents a set of detailed examples. Each chapter begins with an introduction and concludes with related topics. Written by one of the foremost authorities in aeronautical/aerospace engineering, this self-contained book gives the necessary mathematical background and physical principles to build models for technological and scientific purposes. It shows how to formulate problems, justify the solutions, and interpret the results. The request to organize under its patronage at Poitiers in 1998 a Symposium entitled “Advanced Optical Methods and Applications in Solid Mechanics” by the International Union of Theoretical and Applied Mechanics (I.U.T.A.M.) was well received for the following two reasons. First, for nearly 20 years no Symposium devoted to optical methods in solids had been organized. Second, recent advances in digital image processing provided many new applications which are described in the following. We have the honour to present here the proceedings of this Symposium. st th The Symposium took place from august 31 to September 4 at the Institut International de la Prospective in Futuroscope near Poitiers. A significant number of internationally renowned specialists had expressed their wish to participate in this meeting. The Scientific Committee proposed 16 general conferences and selected 33 regular lectures and 17 poster

presentations. Papers corresponding to posters are not differentiated in the proceedings from those that were presented orally. It is worth noting that a total of 80 participants, representing 16 countries, registered for this symposium.. The Scientific Committee deserves praise for attracting a significant number of young scientists, both as authors and as participants. Let us add our warm acknowledgements to Professor J.W. Dally and to Professor A.S. Kobayashi who, throughout the symposium preparation time, brought us valuable help. Readers intent on mastering the basics should start by reading the first few overview chapters and then delve into the descriptions of specific current applications to see how they actually work. Important future applications are also outlined, including information storage, materials for computer memories, quantum computers, isotopic fibers, isotopic optoelectronics, and quantum electronics. The majority of all knowledge concerning atoms, molecules, and solids has been derived from applications of group theory. Taking a unique, applications-oriented approach, this book gives readers the tools needed to analyze any atomic, molecular, or crystalline solid system. Using a clearly defined, eight-step program, this book helps readers to understand the power of group theory, what information can be obtained from it, and how to obtain it. The book takes in modern topics, such as graphene,

carbon nanotubes and isotopic frequencies of molecules, as well as more traditional subjects: the vibrational and electronic states of molecules and solids, crystal field and ligand field theory, transition metal complexes, space groups, time reversal symmetry, and magnetic groups. With over 100 end-of-chapter exercises, this book is invaluable for graduate students and researchers in physics, chemistry, electrical engineering and materials science. Readers intent on mastering the basics should start by reading the first few overview chapters and then delve into the descriptions of specific current applications to see how they actually work. Important future applications are also outlined, including information storage, materials for computer memories, quantum computers, isotopic fibers, isotopic optoelectronics, and quantum electronics.