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QUANTUM STATISTICAL MECHANICS; GREEN'S FUNCTION METHODS IN EQUILIBRIUM AND NON-EQUILIBRIUM PROBLEMS [BY] LEO P. KADANOFF [AND] GORDON BAYM

QUANTUM STATISTICAL MECHANICS

GREEN'S FUNCTION METHODS IN EQUILIBRIUM AND NONEQUILIBRIUM PROBLEMS

THEORETICAL AND MATHEMATICAL PHYSICS

American Mathematical Soc.

THE NON-EQUILIBRIUM GREEN'S FUNCTION METHOD FOR NANOSCALE DEVICE SIMULATION

Springer For modeling the transport of carriers in nanoscale devices, a Green-function formalism is the most accurate approach. Due to the complexity of the formalism, one should have a deep understanding of the underlying principles and use smart approximations and numerical methods for solving the kinetic equations at a reasonable computational time. In this book the required concepts from quantum and statistical mechanics and numerical methods for calculating Green functions are presented. The Green function is studied in detail for systems both under equilibrium and under nonequilibrium conditions. Because the formalism enables rigorous modeling of different scattering mechanisms in terms of self-energies, but an exact evaluation of self-energies for realistic systems

is not possible, their approximation and inclusion in the quantum kinetic equations of the Green functions are elaborated. All the elements of the kinetic equations, which are the device Hamiltonian, contact self-energies and scattering self-energies, are examined and efficient methods for their evaluation are explained. Finally, the application of these methods to study novel electronic devices such as nanotubes, graphene, Si-nanowires and low-dimensional thermoelectric devices and photodetectors are discussed.

GREEN'S FUNCTIONS AND BOUNDARY ELEMENT ANALYSIS FOR MODELING OF MECHANICAL BEHAVIOR OF ADVANCED MATERIALS

DIANE Publishing Demonstrates the potential of Green's functions & boundary element methods in solving a broad range of practical materials science problems. Papers include: Accurate Discretization of Integral Operators, Boundary Element Analysis of Bimaterials Using Anisotropic Elastic Green's Functions, Mechanical Properties of Metal-Matrix Composites, Approximate Operators for Boundary Integral Equations in Transient Elastodynamics, Simulation of the Electrochemical Machining Process Using a 2D Fundamental Singular Solution, Elastic Green's Functions for Anisotropic Solids, & more. Charts & tables.

STATISTICAL MECHANICS AND THE PHYSICS OF MANY-PARTICLE MODEL SYSTEMS

World Scientific The book is devoted to the study of the correlation effects in many-particle systems. It presents the advanced methods of quantum statistical mechanics (equilibrium and nonequilibrium), and shows their effectiveness and operational ability in applications to problems of quantum solid-state theory, quantum theory of magnetism and the kinetic theory. The book includes description of the fundamental concepts and techniques of analysis following the approach of N N Bogoliubov's school, including recent developments. It provides an overview that introduces the main notions of quantum many-particle physics with the emphasis on concepts and models. This book combines the features of textbook and research monograph. For many topics the aim is to start from the beginning and to guide the reader to the threshold of advanced researches. Many chapters include also additional information and discuss many complex research areas which are not often discussed in other places. The book is useful for established researchers to organize and present the advanced material disseminated in the literature. The book contains also an extensive bibliography. The book serves undergraduate, graduate and postgraduate students, as well as researchers who have had prior experience with the subject matter at a more elementary level or have used other many-particle techniques.

ADVANCED PHYSICS OF ELECTRON TRANSPORT IN SEMICONDUCTORS

AND NANOSTRUCTURES

Springer This textbook is aimed at second-year graduate students in Physics, Electrical Engineering, or Materials Science. It presents a rigorous introduction to electronic transport in solids, especially at the nanometer scale.Understanding electronic transport in solids requires some basic knowledge of Hamiltonian Classical Mechanics, Quantum Mechanics, Condensed Matter Theory, and Statistical Mechanics. Hence, this book discusses those sub-topics which are required to deal with electronic transport in a single, self-contained course. This will be useful for students who intend to work in academia or the nano/ micro-electronics industry.Further topics covered include: the theory of energy bands in crystals, of second quantization and elementary excitations in solids, of the dielectric properties of semiconductors with an emphasis on dielectric screening and coupled interfacial modes, of electron scattering with phonons, plasmons, electrons and photons, of the derivation of transport equations in semiconductors and semiconductor nanostructures somewhat at the quantum level, but mainly at the semi-classical level. The text presents examples relevant to current research, thus not only about Si, but also about III-V compound semiconductors, nanowires, graphene and graphene nanoribbons. In particular, the text gives major emphasis to plane-wave methods applied to the electronic structure of solids, both DFT and empirical pseudopotentials, always paying attention to their effects on electronic transport and its numerical treatment. The core of the text is electronic transport, with ample discussions of the transport equations derived both in the quantum picture (the Liouville-von Neumann equation) and semi-classically (the Boltzmann transport equation, BTE). An advanced chapter, Chapter 18, is strictly related to the 'tricky' transition from the time-reversible Liouville-von Neumann equation to the time-irreversible Green's functions, to the density-matrix formalism and, classically, to the Boltzmann transport equation. Finally, several methods for solving the BTE are also reviewed, including the method of moments, iterative methods, direct matrix inversion, Cellular Automata and Monte Carlo. Four appendices complete the text.

QUANTUM FOUNDATIONS AND OPEN QUANTUM SYSTEMS: LECTURE NOTES OF THE ADVANCED SCHOOL

World Scientific The Advanced School on Quantum Foundations and Open Quantum Systems was an exceptional combination of lectures. These comprise lectures in standard physics and investigations on the foundations of quantum physics.On the one hand it included lectures on quantum information, quantum open systems, quantum transport and quantum solid state. On the other hand it included lectures on quantum measurement, models for elementary particles, sub-quantum structures and aspects on the philosophy and principles of quantum physics.The special program of this school offered a broad outlook on the current and

near future fundamental research in theoretical physics.The lectures are at the level of PhD students.

SIMULATION WITH ENTROPY THERMODYNAMICS

MDPI Beyond its identification with the second law of thermodynamics, entropy is a formidable tool for describing systems in their relationship with their environment. This book proposes to go through some of these situations where the formulation of entropy, and more precisely, the production of entropy in out-of-equilibrium processes, makes it possible to forge an approach to the behavior of very different systems. Whether for dimensioning structures; influencing parameter variability; or optimizing power, efficiency, or waste heat reduction, simulations based on entropy production offer a tool that is both compact and reliable. In the case of systems marked by complexity, it appears to be the only way. In that sense, realistic optimization can be carried out, integrating within the same framework both the system and all the constraints and boundary conditions that define it. Simulations based on entropy give the researcher a powerful analytical framework that crosses the disciplines of physics and links them together.

STOCHASTIC APPROACHES TO ELECTRON TRANSPORT IN MICRO- AND NANOSTRUCTURES

Springer Nature The book serves as a synergistic link between the development of mathematical models and the emergence of stochastic (Monte Carlo) methods applied for the simulation of current transport in electronic devices. Regarding the models, the historical evolution path, beginning from the classical charge carrier transport models for microelectronics to current quantum-based nanoelectronics, is explicatively followed. Accordingly, the solution methods are elucidated from the early phenomenological single particle algorithms applicable for stationary homogeneous physical conditions up to the complex algorithms required for quantum transport, based on particle generation and annihilation. The book fills the gap between monographs focusing on the development of the theory and the physical aspects of models, their application, and their solution methods and monographs dealing with the purely theoretical approaches for finding stochastic solutions of Fredholm integral equations.

THEORY AND SIMULATION METHODS FOR ELECTRONIC AND PHONONIC TRANSPORT IN THERMOELECTRIC MATERIALS

Springer Nature This book introduces readers to state-of-the-art theoretical and simulation techniques for determining transport in complex band structure materials and nanostructured-geometry materials, linking the techniques developed by the electronic transport community to the materials science community. Starting from the semi-classical Boltzmann

Transport Equation method for complex band structure materials, then moving on to Monte Carlo and fully quantum mechanical models for nanostructured materials, the book addresses the theory and computational complexities of each method, as well as their advantages and capabilities. Presented in language that is accessible to junior computational scientists, while including enough detail and depth with regards to numerical implementation to tackle modern research problems, it offers a valuable resource for computational scientists and postgraduate researchers whose work involves the theory and simulation of electro-thermal transport in advanced materials.

KINETICS AND THERMODYNAMICS OF FAST PARTICLES IN SOLIDS

CRC Press Kinetics and Thermodynamics of Fast Particles in Solids examines the kinetics and non-equilibrium statistical thermodynamics of fast charged particles moving in crystals in different modes. It follows a line of research very different from traditional ways of constructing a theory of radiation effects, which gives a purely mechanistic interpretatio

LIQUID GLASS TRANSITION

A UNIFIED THEORY FROM THE TWO BAND MODEL

Newnes A glass is disordered material like a viscous liquid and behaves mechanically like a solid. A glass is normally formed by supercooling the viscous liquid fast enough to avoid crystallization, and the liquid-glass transition occurs in diverse manners depending on the materials, their history, and the supercooling processes, among other factors. The glass transition in colloids, molecular systems, and polymers is studied worldwide. This book presents a unified theory of the liquid-glass transition on the basis of the two band model from statistical quantum field theory associated with the temperature Green's function method. It is firmly original in its approach and will be of interest to researchers and students specializing in the glass transition across the physical sciences. Examines key theoretical problems of the liquid-glass transition and related phenomena Clarifies the mechanism and the framework of the liquid-glass transition

MOLECULAR ELECTRONICS

MOLECULAR ELECTRONICS: AN INTRODUCTION TO THEORY AND EXPERIMENT (2ND EDITION)

World Scientific Molecular Electronics is self-contained and unified in its presentation. It can be used as a textbook on nanoelectronics by graduate students and advanced undergraduates studying physics and chemistry. In addition, included in this new edition are previously unpublished material that will help researchers gain a deeper understanding into the basic

concepts involved in the field of molecular electronics.

ANNOTATIONS TO QUANTUM STATISTICAL MECHANICS

CRC Press This book is a rewritten and annotated version of Leo P. Kadanoff and Gordon Baym's lectures that were presented in the book Quantum Statistical Mechanics: Green's Function Methods in Equilibrium and Nonequilibrium Problems. The lectures were devoted to a discussion on the use of thermodynamic Green's functions in describing the properties of many-particle systems. The functions provided a method for discussing finite-temperature problems with no more conceptual difficulty than ground-state problems, and the method was equally applicable to boson and fermion systems and equilibrium and nonequilibrium problems. The lectures also explained nonequilibrium statistical physics in a systematic way and contained essential concepts on statistical physics in terms of Green's functions with sufficient and rigorous details. In-Gee Kim thoroughly studied the lectures during one of his research projects but found that the unspecialized method used to present them in the form of a book reduced their readability. He started the tedious work of rewriting and annotating them to fully understand the formalism of nonequilibrium quantum statistical mechanics. While doing so, he realized they can be a useful resource for students of modern physics but will have to be upgraded to match pace with the evolved curricula. Being aware that besides completing the course work and passing the relevant examinations, it is necessary for graduate students of modern physics to make the knowledge of a topic concrete in their minds. This book is a systematically prepared summary of those lectures and will be extremely useful for graduate students as well as senior researchers to settle down the key knowledge of the subject.

COMPUTATIONAL ELECTRONICS

SEMICLASSICAL AND QUANTUM DEVICE MODELING AND SIMULATION

CRC Press Starting with the simplest semiclassical approaches and ending with the description of complex fully quantum-mechanical methods for quantum transport analysis of state-of-the-art devices, Computational Electronics: Semiclassical and Quantum Device Modeling and Simulation provides a comprehensive overview of the essential techniques and methods for effectively analyzing transport in semiconductor devices. With the transistor reaching its limits and new device designs and paradigms of operation being explored, this timely resource delivers the simulation methods needed to properly model state-of-the-art nanoscale devices. The first part examines semiclassical transport methods, including drift-diffusion, hydrodynamic, and Monte Carlo methods for solving the Boltzmann transport equation. Details regarding numerical implementation and sample codes are provided as templates for sophisticated simulation

software. The second part introduces the density gradient method, quantum hydrodynamics, and the concept of effective potentials used to account for quantum-mechanical space quantization effects in particle-based simulators. Highlighting the need for quantum transport approaches, it describes various quantum effects that appear in current and future devices being mass-produced or fabricated as a proof of concept. In this context, it introduces the concept of effective potential used to approximately include quantum-mechanical space-quantization effects within the semiclassical particle-based device simulation scheme. Addressing the practical aspects of computational electronics, this authoritative resource concludes by addressing some of the open questions related to quantum transport not covered in most books. Complete with self-study problems and numerous examples throughout, this book supplies readers with the practical understanding required to create their own simulators.

APPLIED MECHANICS REVIEWS

INTEGRAL TRANSFORM TECHNIQUES FOR GREEN'S FUNCTION

Springer Science & Business Media In this book mathematical techniques for integral transforms are described in detail but concisely. The techniques are applied to the standard partial differential equations, such as the Laplace equation, the wave equation and elasticity equations. The Green's functions for beams, plates and acoustic media are also shown along with their mathematical derivations. Lists of Green's functions are presented for the future use. The Cagniard's-de Hoop method for the double inversion is described in detail, and 2D and 3D elasto-dynamics problems are fully treated.

LECTURES ON SELECTED TOPICS IN STATISTICAL MECHANICS

INTERNATIONAL SERIES IN NATURAL PHILOSOPHY

Elsevier Lectures on Selected Topics in Statistical Mechanics is a collection of lectures given at the 1971 Simla Summer School of Statistical Mechanics held in India. The lectures explore a wide range of topics related to statistical mechanics, including occupation number representation; the Green function method; the pair Hamiltonian model of an imperfect Bose gas; fluctuations in a perfect Bose gas; and the equation of state of an imperfect gas. A simple derivation of the Bloch equation is also presented, along with the statistical mechanics of stellar systems. Comprised of eight chapters, this volume begins with a discussion on the occupation number representation by considering some relevant formulae from ensemble theory. Classical petit and grand ensembles are described, together with quanta1 petit and grand ensembles. Subsequent chapters focus on the Green function method in statistical mechanics; the pair Hamiltonian model of the imperfect Bose gas and its solution in the absence of Bose-Einstein

condensation using Green function methods and diagrammatic techniques; fluctuations in a perfect Bose gas; the equation of state of an imperfect gas; and a simple derivation of the Bloch equation. Finally, the statistical mechanics of stellar systems and an approach to equilibrium are described. This book will be of interest to physicists.

FEYNMAN DIAGRAM TECHNIQUES IN CONDENSED MATTER PHYSICS

Cambridge University Press An introduction to the application of Feynman diagram techniques for researchers and advanced undergraduate students in condensed matter theory and many-body physics.

QUANTUM STATISTICAL MECHANICS

CRC Press Green's Function Methods in Equilibrium and Nonequilibrium Problems

MICROMECHANICS OF COMPOSITE MATERIALS

Springer Science & Business Media This book presents a broad exposition of analytical and numerical methods for modeling composite materials, laminates, polycrystals and other heterogeneous solids, with emphasis on connections between material properties and responses on several length scales, ranging from the nano and microscales to the macroscale. Many new results and methods developed by the author are incorporated into the rich fabric of the subject, which has developed from the work of many researchers over the last 50 years. Among the new results, the book offers an extensive analysis of internal and interface stresses caused by eigenstrains, such as thermal, transformation and inelastic strains in the constituents, which often exceed those caused by mechanical loads, and of inelastic behavior of metal matrix composites. Fiber prestress in laminates, and modeling of functionally graded materials are also analyzed. Furthermore, this book outlines several key subjects on modeling the properties of composites reinforced by particles of various shapes, aligned fibers, symmetric laminated plates and metal matrix composites. This volume is intended for advanced undergraduate and graduate students, researchers and engineers interested and involved in analysis and design of composite structures.

STATICS AND INFLUENCE FUNCTIONS

FROM A MODERN PERSPECTIVE

Springer Nature This extended and revised second edition is intended for engineering students and researchers working with finite element methods in structural and mechanical analysis. Discussing numerical structural analysis from first mechanical and mathematical principles, it establishes the central role of influence functions (Green's functions) in linear computational mechanics. The main features of the book are mentioned

below. · Introducing Green's first and second identity as the core theorems of statics and mechanics. Formulation of the variational and energy principles of mechanics with an emphasis on the computational aspects and on the qualitative features of variational solutions. · Derivation of influence functions from duality principles, the distinction between weak and strong influence functions, the difference between monopoles and dipoles and how amputated dipoles lead to singularities, and how singularities on the boundary pollute the solution inside the domain - an unavoidable effect in 2-D and 3-D. · A detailed discussion of the various features of the finite element method and the key role of the notion of "shake-equivalence" as originally introduced by Turner et alt. Establishing that in linear finite element analysis the accuracy depends on the accuracy of the influence functions. Introducing Betti extended as a core theorem of finite element analysis. · A systematic treatment of the role which Green's functions play in reanalysis, sensitivity analysis, parameter identification and in optimization. Explaining why averaging material parameters succeeds and how local stiffness changes can be identified with the action of equilibrium forces f+. · Presenting a new technique, one-click reanalysis, which allows to make modifications to a structure by clicking on single elements and seeing directly the new shape, bypassing the need to solve the modified system. · Four programs for the solution of the Poisson equation, 2-D elasticity, plate-bending problems and planar frames are offered for download in this second edition. These are all-purpose programs but with a particular emphasis on influence functions. The frame program also demonstrates one-click reanalysis.

NUCLEAR SCIENCE ABSTRACTS

EQUILIBRIUM AND NON-EQUILIBRIUM STATISTICAL MECHANICS

(NEW AND REVISED PRINTING)

World Scientific Publishing Company This book encompasses our current understanding of the ensemble approach to many-body physics, phase transitions and other thermal phenomena, as well as the quantum foundations of linear response theory, kinetic equations and stochastic processes. It is destined to be a standard text for graduate students, but it will also serve the specialist-researcher in this fascinating field; some more elementary topics have been included in order to make the book self-contained. The historical methods of J Willard Gibbs and Ludwig Boltzmann, applied to the quantum description rather than phase space, are featured. The tools for computations in the microcanonical, canonical and grand-canonical ensembles are carefully developed and then applied to a variety of classical and standard quantum situations. After the language of second quantization has been introduced, strongly interacting systems, such as quantum liquids, superfluids and superconductivity, are treated in detail. For the connoisseur, there is a section on diagrammatic methods and

applications. In the second part dealing with non-equilibrium processes, the emphasis is on the quantum foundations of Markovian behaviour and irreversibility via the Pauli–Van Hove master equation. Justifiable linear response expressions and the quantum-Boltzmann approach are discussed and applied to various condensed matter problems. From this basis the Onsager–Casimir relations are derived, together with the mesoscopic master equation, the Langevin equation and the Fokker–Planck truncation procedure. Brownian motion and modern stochastic problems such as fluctuations in optical signals and radiation fields briefly make the round.

INFLUENCE OF PARTICLE BEAM IRRADIATION ON THE STRUCTURE AND PROPERTIES OF GRAPHENE

Springer This thesis focuses on the nanomanufacturing of graphene—a newly discovered, two-dimensional material with extraordinary properties—in order to realize its numerous potential applications. Combining experimental implementation with theoretical modelling, it investigates three classes of graphene nanostructure fabrication using particle beam irradiation: (i) doping of graphene using low energy nitrogen irradiation; (ii) joining of graphene sheets with laser and C, N, and Ar ion beam irradiation; and (iii) fabrication of graphene nanopores by means of focused ion beam and electron beam irradiation. The feasibility of the nanomanufacture of graphene using particle beam irradiation is demonstrated by various experimental methods, and the mechanisms involved under different types of beam irradiation are revealed using theoretical calculations. Further, the book analyzes the mechanical and electrical properties of the fabricated graphene nanostructures by means of atomic simulations to predict the application potentials of the proposed methods. The findings help promote the implementation of graphene-structure applications in industry.

GREEN'S FUNCTIONS

CONSTRUCTION AND APPLICATIONS

Walter de Gruyter This monograph is looking at applied elliptic and parabolic type partial differential equations in two variables. The elliptic type includes the Laplace, static Klein-Gordon and biharmonic equation. The parabolic type is represented by the classical heat equation and the Black-Scholes equation which has emerged as a mathematical model in financial mathematics. This book is a useful source for everyone who is studying or working in the fields of science, finance, or engineering that involve practical solution of partial differential equations.

THE PHYSICS OF PHASE SPACE

NONLINEAR DYNAMICS AND CHAOS, GEOMETRIC QUANTIZATION,AND WIGNER FUNCTION

Springer The concept of phase space plays a decisive role in the study of the transition from classical to quantum physics. This is particularly the case in areas such as nonlinear dynamics and chaos, geometric quantization and the study of the various semi-classical theories, which are the setting of the present volume. Much of the content is devoted to the study of the Wigner distribution. This volume gives the first complete survey of the progress made by both mathematicians and physicists. It will serve as an excellent reference for further research.

JOURNAL OF APPLIED MECHANICS

DYNAMIC MATERIALS MODELS IN COMPUTER PROGRAMS

WORKSHOP PROCEEDINGS

DIANE Publishing Presents unrevised proceedings of a 1996 workshop on material modeling held in Stockholm. Discussions include: analysis of concrete structures using Abaqus/Explicit; brittle failure and crack propagation in concrete; implementation of material models in Dyna-3D; analysis of impact on reinforced concrete structures with LS-Dyna3D; modeling of brittle materials for hydrocodes; implementation of the Johnson-Holmquist model as a user subroutine in Autodyne and penetration of tungsten rods into Alumina targets; and testing materials with "Hopkinson Torsion Bar" equipment. Charts and tables.

SELECTED PROBLEMS OF CONTEMPORARY THERMOMECHANICS

BoD – Books on Demand Thermomechanics is a scientific discipline which investigates the behavior of bodies under the action forces and heat input. Thermomechanical phenomena commonly occur in the human environment, from the action of solar radiation to the technological processes. The analysis of these phenomena often requires extensive interdisciplinary knowledge and the application of advanced mathematical apparatus. Thermo-mechanical phenomena are analyzed using analytical and numerical methods. The analytical solution offers a quicker assessment of the searched values and its dependence on the various parameters. Some problems can be solved only by numerical methods, of which the finite element method is commonly used. This book intends to present current trends and methods in solving thermomechanics problems.

STATIC GREEN'S FUNCTIONS IN ANISOTROPIC MEDIA

Cambridge University Press This book presents basic theory on static Green's functions in general anisotropic magnetoelectroelastic media including detailed derivations based on the complex variable method, potential method, and integral transforms. Green's functions

corresponding to the reduced cases are also presented including those in anisotropic and transversely isotropic piezoelectric and piezomagnetic media, and in purely anisotropic elastic, transversely isotropic elastic and isotropic elastic media. Problems include those in three-dimensional, (two-dimensional) infinite, half, and biomaterial spaces (planes). While the emphasis is on the Green's functions related to the line and point force, those corresponding to the important line and point dislocation are also provided and discussed. This book provides a comprehensive derivation and collection of the Green's functions in the concerned media, and as such, it is an ideal reference book for researchers and engineers, and a textbook for both students in engineering and applied mathematics.

BOUNDARY ELEMENT ANALYSIS IN COMPUTATIONAL FRACTURE MECHANICS

Springer Science & Business Media The Boundary Integral Equation (BIE) method has occupied me to various degrees for the past twenty-two years. The attraction of BIE analysis has been its unique combination of mathematics and practical application. The EIE method is unforgiving in its requirement for mathe matical care and its requirement for diligence in creating effective numerical algorithms. The EIE method has the ability to provide critical inSight into the mathematics that underlie one of the most powerful and useful modeling approximations ever devised--elasticity. The method has even revealed important new insights into the nature of crack tip plastic strain distributions. I believe that EIE modeling of physical problems is one of the remaining opportunities for challenging and fruitful research by those willing to apply sound mathematical discipline coupled with phys ical insight and a desire to relate the two in new ways. The monograph that follows is the summation of many of the successes of that twenty-two years, supported by the ideas and synergisms that come from working with individuals who share a common interest in engineering mathematics and their application. The focus of the monograph is on the application of EIE modeling to one of the most important of the solid mechanics disciplines--fracture mechanics. The monograph is not a trea tise on fracture mechanics, as there are many others who are far more qualified than I to expound on that topic.

PHYSICAL STRUCTURE

Elsevier The primary goal of this book is to summarize the current level of accumulated knowledge about the physical structure of solid surfaces with emphasis on well-defined surfaces at the gas-solid and vacuum-solid interfaces. The intention is not only to provide a standard reference for practitioners, but also to provide a good starting point for scientists who are just entering the field. The presentation in most of the chapters therefore assumes that the typical reader will have a good undergraduate background in chemistry, physics, or materials science. At the same time,

coverage is comprehensive and at a high technical level with emphasis on fundamental physical principles. This first volume in a new series is appropriately devoted to the physical structure of surfaces, knowledge of which will be essential for a complete understanding of electronic properties and dynamical processes, the topics of the next two volumes in the series. The volume is divided into four parts. Part I describes the equilibrium properties of surfaces with emphasis on clean surfaces of bulk materials. Part II provides an introduction to some of the primary experimental methods that are used to determine surface crystal structures. Part III gives an overview of the vast topic of the structure of adsorbed layers. The concluding Part IV deals with the topics of defects in surface structures and phase transitions.

THEORETICAL AND MATHEMATICAL PHYSICS

MATHEMATICAL REVIEWS

THE HISTORY OF THE THEORY OF STRUCTURES

SEARCHING FOR EQUILIBRIUM

John Wiley & Sons Ten years after the publication of the first English edition of The History of the Theory of Structures, Dr. Kurrer now gives us a much enlarged second edition with a new subtitle: Searching for Equilibrium. The author invites the reader to take part in a journey through time to explore the equilibrium of structures. That journey starts with the emergence of the statics and strength of materials of Leonardo da Vinci and Galileo, and reaches its first climax with Coulomb's structural theories for beams, earth pressure and arches in the late 18th century. Over the next 100 years, Navier, Culmann, Maxwell, Rankine, Mohr, Castigliano and Müller-Breslau moulded theory of structures into a fundamental engineering science discipline that - in the form of modern structural mechanics - played a key role in creating the design languages of the steel, reinforced concrete, aircraft, automotive and shipbuilding industries in the 20th century. In his portrayal, the author places the emphasis on the formation and development of modern numerical engineering methods such as FEM and describes their integration into the discipline of computational mechanics. Brief insights into customary methods of calculation backed up by historical facts help the reader to understand the history of structural mechanics and earth pressure theory from the point of view of modern engineering practice. This approach also makes a vital contribution to the teaching of engineers. Dr. Kurrer manages to give us a real feel for the different approaches of the players involved through their engineering science profiles and personalities, thus creating awareness for the social context. The 260 brief biographies convey the subjective aspect of theory of structures and structural mechanics from the early years of the modern era to the present day. Civil and structural engineers and

architects are well represented, but there are also biographies of mathematicians, physicists, mechanical engineers and aircraft and ship designers. The main works of these protagonists of theory of structures are reviewed and listed at the end of each biography. Besides the acknowledged figures in theory of structures such as Coulomb, Culmann, Maxwell, Mohr, Müller-Breslau, Navier, Rankine, Saint-Venant, Timoshenko and Westergaard, the reader is also introduced to G. Green, A. N. Krylov, G. Li, A. J. S. Pippard, W. Prager, H. A. Schade, A. W. Skempton, C. A. Truesdell, J. A. L. Waddell and H. Wagner. The pioneers of the modern movement in theory of structures, J. H. Argyris, R. W. Clough, T. v. Kármán, M. J. Turner and O. C. Zienkiewicz, are also given extensive biographical treatment. A huge bibliography of about 4,500 works rounds off the book. New content in the second edition deals with earth pressure theory, ultimate load method, an analysis of historical textbooks, steel bridges, lightweight construction, theory of plates and shells, Green's function, computational statics, FEM, computer-assisted graphical analysis and historical engineering science. The number of pages now exceeds 1,200 - an increase of 50% over the first English edition. This book is the first all-embracing historical account of theory of structures from the 16th century to the present day.

HOT CARRIERS IN SEMICONDUCTORS, PROCEEDINGS OF THE 7TH INT CONFERENCE ON HOT CARRIERS IN SEMICONDUCTORS (HCIS-7) 1-5 JULY 1991, NARA, JAPAN

CRC Press The proceedings of the 7th International Conference on [title] held in Nara, Japan, July 1992, comprise three plenary, 25 invited, and 148 contributed papers in the areas of: electron-phonon interaction, confined phonon modes, optical study of ultrafast processes, heterostructures/low dimensional transport, hot carrier scattering and relaxation, tr.

UNIVERSITY OF MICHIGAN OFFICIAL PUBLICATION

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