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KEY=KINETIC - ISAIAS LOGAN

A Paradigm for Integrated Warfighting: Kinetic and Non-kinetic Solutions

Review of the U.S. Air Force's (USAF) performance during the Gulf War resulted in establishing a requirement for formal training at the operational level of warfare. This requirement was articulated as the interactions of people, process, and technology -- in that order of importance. Concurrent with the emphasis on operational warfighting and the revolution in information technology, the USAF had to adjust to the battlefield imperative of gaining and maintaining information dominance. Starting in 1994, the USAF was faced with two problems resulting from the Gulf War and subsequent analysis. The first problem was the development of an integrated training program that provided training support to the entire Joint Forces Air Component Commander (JFACC) Team, ranging from the supporting command and control system of systems to the JFACC himself. The second challenge lay in how the arguments concerning the possible Revolution in Military Affairs (RMA) could be incorporated in tactical, theater, and strategic planning and execution. To this end, the USAF Air Combat Command (ACC) initiated a JFACC Team training program. The center of this training is the Air Force Command and Control Training and Innovation Group (AFC2TIG) at Hurlburt Field, Florida. The Air Force has built a substantive program around the BLUE FLAG exercise and a series of training courses. Audiences range from airman to general officer. This paper

reviews the training concept involved in this effort, with a focus on how Information Warfare/Information Operations have been integrated into the training and exercise environment. The concept includes the integration of kinetic and non-kinetic solutions to targeting in support of theater goals and objectives. In general, this involves the use of the RAND strategies of task methodology and effects-based targeting.

Kinetic Solutions

A Handsome Rob Gig

Kinetic Formulation of Conservation Laws

Oxford University Press *Written by a well-known expert in the field, the focus of this book is on an innovative mathematical and numerical theory which applies to classical models of physics such as shock waves and balance laws. The text is based on early works in common with P.L. Lions (field medalist).*

Kinetic Solutions of the Boltzmann Peierls Equation and Its Moment Systems

Nonlinear Partial Differential Equations and Hyperbolic Wave Phenomena

2008-2009 Research Program on Nonlinear Partial Differential Equations, Centre for Advanced Study of the Norwegian Academy of Sciences and Letters, Oslo, Norway

American Mathematical Soc. *This volume presents the state of the art in several directions of research conducted by renowned mathematicians who participated in the research program on Nonlinear Partial Differential Equations at the Centre for Advanced Study at the Norwegian Academy of Science and Letters, Oslo, Norway, during the academic year 2008-09. The main theme of the volume is nonlinear partial differential equations that model a wide variety of wave phenomena. Topics discussed include systems of conservation laws, compressible Navier-Stokes equations, Navier-Stokes-Korteweg type systems in models for phase transitions, nonlinear evolution equations, degenerate/mixed type equations in fluid mechanics and differential geometry, nonlinear dispersive wave equations (Korteweg-de Vries, Camassa-Holm type, etc.), and Poisson interface problems and level set formulations.*

Stochastic and Dynamic Views of Chemical Reaction Kinetics in Solutions

PPUR presses polytechniques

Proceedings of the Conference on Differential &

Difference Equations and Applications

Melbourne, Aug. 1-5, 2005

Hindawi Publishing Corporation

Contemporary Enzyme Kinetics and Mechanism

Reliable Lab Solutions

Academic Press *Kinetic studies of enzyme action provide powerful insights into the underlying mechanisms of catalysis and regulation. These approaches are equally useful in examining the action of newly discovered enzymes and therapeutic agents. Contemporary Enzyme Kinetics and Mechanism, Second Edition presents key articles from Volumes 63, 64, 87, 249, 308 and 354 of Methods in Enzymology. The chapters describe the most essential and widely applied strategies. A set of exercises and problems is included to facilitate mastery of these topics. The book will aid the reader to design, execute, and analyze kinetic experiments on enzymes. Its emphasis on enzyme inhibition will also make it attractive to pharmacologists and pharmaceutical chemists interested in rational drug design. Of the seventeen chapters presented in this new edition, ten did not previously appear in the first edition. Transient kinetic approaches to enzyme mechanisms Designing initial rate enzyme assay Deriving initial velocity and isotope exchange rate equations Plotting and statistical methods for analyzing rate data Cooperativity in enzyme function Reversible enzyme inhibitors as mechanistic probes Transition-state and multisubstrate inhibitors Affinity labeling to probe enzyme structure and function Mechanism-based enzyme inactivators Isotope exchange methods for elucidating enzymatic catalysis Kinetic isotope effects in enzyme catalysis Site-directed mutagenesis in studies of enzyme catalysis*

Modeling Magnetospheric Plasma

American Geophysical Union *Published by the American Geophysical Union as part of the Geophysical Monograph Series, Volume 44. Existing models of the plasma distribution and dynamics in magnetosphere / ionosphere systems form a patchwork quilt of*

different techniques and boundaries chosen to define tractable problems. With increasing sophistication in both observational and modeling techniques has come the desire to overcome these limitations and strive for a more unified description of these systems. On the observational side, we have recently acquired routine access to diagnostic information on the lowest energy bulk plasma, completing our view of the plasma and making possible comparisons with magnetohydrodynamic calculations of plasma moments. On the theoretical side, rising computational capabilities and shrewdly designed computational techniques have permitted the first attacks on the global structure of the magnetosphere. Similar advances in the modeling of neutral atmospheric circulation suggest an emergent capability to globally treat the coupling between plasma and neutral gases. Simultaneously, computer simulation has proven to be a very useful tool for understanding magnetospheric behaviors on smaller space and time scales.

The Chemical Statics and Kinetics of Solutions

Academic Press

Transport, Relaxation, and Kinetic Processes in Electrolyte Solutions

Springer Science & Business Media *The presence of freely moving charges gives peculiar properties to electrolyte solutions, such as electric conductance, charge transfer, and junction potentials in electrochemical systems. These charges play a dominant role in transport processes, by contrast with classical equilibrium thermodynamics which considers the electrically neutral electrolyte compounds. The present status of transport theory does not permit a first prin ciples analys1s of all transport phenomena with a detailed model of the relevant interactions. Host of the models are still unsufficient for real systems of reasonable complexity. The Liouville equation may be adapted with some Brownian approximations to problems of interact ing solute particles in a continuum (solvent>; however, keeping the Liouville level beyond the limiting laws is an unsolvable task. Some progress was made at the Pokker-Planck level; however, despite a promising start, this theory in its actual form is still unsatis factory for complex systems involving many ions and chemical reac tions. A better approach is provided by the so-called Smoluchowski level in which average velocities are used, but there the hydrodyna mic interactions produce some difficulties. The chemist or chemical engineer, or anyone working with complex electrolyte solutions in applied research wants a general representa tion of the transport phenomena which does not reduce the natural complexity of the multicomponent systems. Reduction of the natural complexity generally is connected*

with substantial changes of the systems.

Kinetics of Catalytic Reactions--Solutions Manual

Springer *This manual of solutions to the problems in "Kinetics of Catalytic Reactions" has been prepared to assist those who use this book in a teaching function. However, these solutions should also benefit those outside the classroom who want to apply the principles and concepts that are discussed in the book. By studying and observing the approaches used in solving these problems, it is very likely that similar applications can be envisioned in different kinetic problems that the investigator might face. Thus the availability ofthese solutions is a good learning tool for everyone. Additional details and insight about the solutions provided can be obtained by reading the cited references. I have tried to eliminate all errors, both conceptual and typographical, in these solutions; however, the probability is high that I have not succeeded completely. Should any errors of commission (or omission) be found, I would greatly appreciate being informed. I can be reached at this email address: mavche@engr.psu.edu, or mail can be sent to me at: 107 Fenske Laboratory, Department of Chemical Engineering, The Pennsylvania State University, University Park, PA 16802. Albert Vannice v Contents Preface v Solutions to Problems Chapter 3 - Catalyst Characterization .*

ENZYMES: Catalysis, Kinetics and Mechanisms

Springer *This enzymology textbook for graduate and advanced undergraduate students covers the syllabi of most universities where this subject is regularly taught. It focuses on the synchrony between the two broad mechanistic facets of enzymology: the chemical and the kinetic, and also highlights the synergy between enzyme structure and mechanism. Designed for self-study, it explains how to plan enzyme experiments and subsequently analyze the data collected. The book is divided into five major sections: 1] Introduction to enzymes, 2] Practical aspects, 3] Kinetic Mechanisms, 4] Chemical Mechanisms, and 5] Enzymology Frontiers. Individual concepts are treated as stand-alone chapters; readers can explore any single concept with minimal cross-referencing to the rest of the book. Further, complex approaches requiring specialized techniques and involved experimentation (beyond the reach of an average laboratory) are covered in theory with suitable references to guide readers. The book provides students, researchers and academics in the broad area of biology with a sound theoretical and practical knowledge of enzymes. It also caters to those who do not have a practicing enzymologist to teach them the subject.*

Chemical Reaction Kinetics

Concepts, Methods and Case Studies

John Wiley & Sons *A practical approach to chemical reaction kinetics—from basic concepts to laboratory methods—featuring numerous real-world examples and case studies This book focuses on fundamental aspects of reaction kinetics with an emphasis on mathematical methods for analyzing experimental data and interpreting results. It describes basic concepts of reaction kinetics, parameters for measuring the progress of chemical reactions, variables that affect reaction rates, and ideal reactor performance. Mathematical methods for determining reaction kinetic parameters are described in detail with the help of real-world examples and fully-worked step-by-step solutions. Both analytical and numerical solutions are exemplified. The book begins with an introduction to the basic concepts of stoichiometry, thermodynamics, and chemical kinetics. This is followed by chapters featuring in-depth discussions of reaction kinetics; methods for studying irreversible reactions with one, two and three components; reversible reactions; and complex reactions. In the concluding chapters the author addresses reaction mechanisms, enzymatic reactions, data reconciliation, parameters, and examples of industrial reaction kinetics. Throughout the book industrial case studies are presented with step-by-step solutions, and further problems are provided at the end of each chapter. Takes a practical approach to chemical reaction kinetics basic concepts and methods Features numerous illustrative case studies based on the author's extensive experience in the industry Provides essential information for chemical and process engineers, catalysis researchers, and professionals involved in developing kinetic models Functions as a student textbook on the basic principles of chemical kinetics for homogeneous catalysis Describes mathematical methods to determine reaction kinetic parameters with the help of industrial case studies, examples, and step-by-step solutions Chemical Reaction Kinetics is a valuable working resource for academic researchers, scientists, engineers, and catalyst manufacturers interested in kinetic modeling, parameter estimation, catalyst evaluation, process development, reactor modeling, and process simulation. It is also an ideal textbook for undergraduate and graduate-level courses in chemical kinetics, homogeneous catalysis, chemical reaction engineering, and petrochemical engineering, biotechnology.*

Lectures on Kinetic Processes in Materials

Springer Nature *This book provides beginning graduate or senior-level undergraduate students in materials disciplines with a primer of the fundamental and quantitative ideas on kinetic processes in solid materials. Kinetics is concerned with the rate of change of the state of existence of a material system under thermodynamic driving forces. Kinetic processes in materials typically involve chemical reactions and solid state diffusion in parallel or in tandem. Thus, mathematics of diffusion in continuum is first dealt with in some depth, followed by the atomic theory of diffusion and a brief review of chemical reaction kinetics. Chemical diffusion in metals and ionic solids, diffusion-controlled kinetics of phase transformations, and kinetics of gas-solid reactions are examined. Through this course of learning, a student will become able to predict quantitatively how fast a kinetic process takes place, to understand the inner workings of the process, and to design the optimal process of material state change. Provides students with the tools to predict quantitatively how fast a kinetic process takes place and solve other diffusion related problems; Learns fundamental and quantitative ideas on kinetic processes in solid materials; Examines chemical diffusion in metals and ionic solids, diffusion-controlled kinetics of phase transformations, and kinetics of gas-solid reactions, among others; Contains end-of chapter exercise problems to help reinforce students' grasp of the concepts presented within each chapter.*

Ninth Symposium (International) on Combustion

At Cornell University Ithaca, New York, August 27 to September 1, 1962

Elsevier *Ninth Symposium (International) on Combustion covers the proceedings of the Ninth Symposium (International) on Combustion, held at Cornell University in Ithaca, New York on August 27 to September 1, 1962, under the auspices of the Combustion Institute. The book focuses on the processes and reactions involved in combustion. The selection first offers information on flame strength of propane-oxygen flames at low pressures in turbulent flow and mixing and flow in ducted turbulent jets. Topics include radial profile of the jetting velocity, radial growth of the jet, and mixing zones of a ducted jet. The text then elaborates on turbulent flame studies in two-dimensional open burners; turbulent mass transfer and rates of combustion in confined turbulent flames; and*

flame stabilization in a boundary layer. The publication examines the theoretical study of properties of laminar steady state flames as a function of properties of their chemical components and spectra of alkali metal-organic halide flames. The text then takes a look at the thermal radiation theory for plane flame propagation in coal dust clouds; flame characteristics of the diborane-hydrazine system; and studies of the combustion of dimethyl hydrazine and related compounds. The selection is a dependable reference for readers interested in the processes and reactions involved in combustion.

Electron and Proton Kinetics and Dynamics in Flaring Atmospheres

John Wiley & Sons *This timely book presents new research results on high-energy particle physics related to solar flares, covering the theory and applications of the reconnection process in a clear and comprehensible way. It investigates particle kinetics and dynamics in flaring atmospheres and their diagnostics from spectral observations, while providing an analysis of the observation data and techniques and comparing various models. Written by an internationally acclaimed expert, this is vital reading for all solar, astro-, and plasma physicists working in the field.*

Collisionless Plasmas in Astrophysics

John Wiley & Sons *Collisionless Plasmas in Astrophysics examines the unique properties of media without collisions in plasma physics. Experts in this field, the authors present the first book to concentrate on collisionless conditions in plasmas, whether close or not to thermal equilibrium. Filling a void in scientific literature, Collisionless Plasmas in Astrophysics explains the possibilities of modeling such plasmas, using a fluid or a kinetic framework. It also addresses common misconceptions that even professionals may possess, on phenomena such as "collisionless (Landau) damping". Abundant illustrations are given in both space physics and astrophysics.*

Transfer of Radiation in Spectral Lines

Analysis and Numerics for Conservation Laws

Springer Science & Business Media *Whatdoasupernovaexplosioninouterspace,?owaroundanairfoil and knocking in combustion engines have in common? The physical and chemical mechanisms as well as the sizes of these processes are quite di?erent. So are the motivations for studying them scienti?cally. The super- 8 nova is a thermo-nuclear explosion on a scale of 10 cm. Astrophysicists try to understand them in order to get insight into fundamental properties of the universe. In ?ows around airfoils of commercial airliners at the scale of 3 10 cm shock waves occur that in?uence the stability of the wings as well as fuel consumption in ?ight. This requires appropriate design of the shape and structure of airfoils by engineers. Knocking occurs in combustion, a chemical 1 process, and must be avoided since it damages motors. The scale is 10 cm and these processes must be optimized for e?ciency and environmental conside- tions. The common thread is that the underlying ?uid ?ows may at a certain scale of observation be described by basically the same type of hyperbolic s- tems of partial di?erential equations in divergence form, called conservation laws. Astrophysicists, engineers and mathematicians share a common interest in scienti?c progress on theory for these equations and the development of computational methods for solutions of the equations. Due to their wide applicability in modeling of continua, partial di?erential equationsareamajor?eldofresearchinmathematics. Asubstantialportionof mathematical research is related to the analysis and numerical approximation of solutions to such equations. Hyperbolic conservation laws in two or more spacedimensionsstillposeoneofthemainchallengestomodernmathematics.*

Hamiltonian Partial Differential Equations and Applications

Springer *This book is a unique selection of work by world-class experts exploring the latest developments in Hamiltonian partial differential equations and their applications. Topics covered within are representative of the field’s wide scope, including KAM and normal form theories, perturbation and variational methods, integrable systems, stability of nonlinear solutions as well as applications to cosmology, fluid mechanics and water waves. The volume contains both surveys and original research papers and gives a concise overview of the above topics, with results ranging from mathematical modeling to rigorous analysis and numerical simulation. It will be of particular interest to graduate students as well as researchers in mathematics and physics, who wish to learn more about the powerful and elegant analytical techniques for Hamiltonian partial differential equations.*

Sustainable Geoscience for Natural Gas SubSurface Systems

Gulf Professional Publishing *Sustainable Geoscience for Natural Gas SubSurface Systems delivers many of the scientific fundamentals needed in the natural gas industry, including coal-seam gas reservoir characterization and fracture analysis modeling for shale and tight gas reservoirs. Advanced research includes machine learning applications for well log and facies analysis, 3D gas property geological modeling, and X-ray CT scanning to reduce environmental hazards. Supported by corporate and academic contributors, along with two well-distinguished editors, the book gives today's natural gas engineers both fundamentals and advances in a convenient resource, with a zero-carbon future in mind. Includes structured case studies to illustrate how new principles can be applied in practical situations Helps readers understand advanced topics, including machine learning applications to optimize predictions, controls and improve knowledge-based applications Provides tactics to accelerate emission reductions Teaches gas fracturing mechanics aimed at reducing environmental impacts, along with enhanced oil recovery technologies that capture carbon dioxide*

Architecture and Adaptation

From Cybernetics to Tangible Computing

Routledge *Architecture and Adaptation discusses architectural projects that use computational technology to adapt to changing conditions and human needs. Topics include kinetic and transformable structures, digitally driven building parts, interactive installations, intelligent environments, early precedents and their historical context, socio-cultural aspects of adaptive architecture, the history and theory of artificial life, the theory of human-computer interaction, tangible computing, and the social studies of technology. Author Socrates Yiannoudes proposes tools and frameworks for researchers to evaluate examples and tendencies in adaptive architecture. Illustrated with more than 50 black and white images.*

Kinetic Decomposition of Approximate Solutions to Conservation Laws

Unified Kinetic Approach for Simulation of Gas Flows in Rarefied and Continuum Regimes

This report was developed under a SBIR contract. The objective of this effort was to develop a computation fluid dynamics tool for air and space flight. Flow fields characterized by the simultaneous presence of continuum and rarefied regimes arise in many important applications, ranging from re-entry of aerospace vehicles to micro-fluidics. In this Phase II SBIR Project, we have developed a Unified Flow Solver with adaptive mesh and algorithm refinement based on direct numerical solution of the Boltzmann equation coupled to kinetic schemes of gas dynamics. Our strategy allowed easy coupling of the continuum and Boltzmann solvers in a hybrid code with automatic domain decomposition. We have demonstrated the UFS capabilities for several one-component gas flows and have confirmed that the hybrid method results in significant savings by limiting expensive kinetic solutions only to the regions where they are needed. The UFS could automatically introduce or remove kinetic patches to maximize accuracy and efficiency of simulations. We have extended UFS to molecular gases with rotationally and vibrationally degrees of freedom and to multi-component reactive gas mixtures. It was demonstrated that the UFS methodology could provide an efficient solution to practical problems of polyatomic gas mixtures of different degrees of rarefaction.

Computational Methods in Sciences and Engineering 2003

World Scientific *In the past few decades, many significant insights have been gained into several areas of computational methods in sciences and engineering. New problems and methodologies have appeared in some areas of sciences and engineering. There is*

always a need in these fields for the advancement of information exchange. The aim of this book is to facilitate the sharing of ideas, problems and methodologies between computational scientists and engineers in several disciplines. Extended abstracts of papers on the recent advances regarding computational methods in sciences and engineering are provided. The book briefly describes new methods in numerical analysis, computational mathematics, computational and theoretical physics, computational and theoretical chemistry, computational biology, computational mechanics, computational engineering, computational medicine, high performance computing, etc. Contents:Components for Time Series Receiver Clock Offset in GPS Solutions (P Abad)Some Numerical Methods for Stiff Problems (J C Butcher)Bifurcation Phenomena in Molecular Vibrational Spectroscopy (S C Farantos)Simulations of Spart in Random Fields (D T Hristopoulos)Electric Properties of Substituted Diacetylenes (P Karamanis & G Maroulis)Data Mining and Cryptology (E C Laskari et al.)A Finite Element Approach for the Dirac Radial Equation (L A A Nikolopoulos)Constraint Based Web Mining (I Petrounias et al.)Axisymmetric Rigid Bodies in Creeping Flow (J Roumeliotis)The Impact of Graphics Calculator on Mathematics Education in Asia (C-Y Suen)On the Systematic Construction of Molecular Basis Sets (S Wilson)and other papers Readership: Researchers and graduate students in any discipline involving scientific computation. Keywords:Numerical Analysis;Computational Mathematics;Computational and Theoretical Physics;Computational Chemistry;Computational Biology;Computational Mechanics;Computational Engineering, Computational Medicine;High Performance Computing

Managing Interactions in Smart Environments

1st International Workshop on Managing Interactions in Smart Environments (MANSE’99), Dublin, December 1999

Springer Science & Business Media *Research into Smart Buildings and Spaces has increased rapidly over the last few years. This volume aims to address the convergence of research in Distributed Systems, Robotics and Human Centred computing within the domain of smart buildings and present a unique opportunity to investigate work that crosses the boundaries of these disciplines. It provides an overview of progress in a fast-moving area, by bringing together researchers, implementors and practitioners and the*

papers draw together the developments and concerns of those working on the different aspects of smart environments, as well as providing views on the future prospects for work in this area.

Kinetic Boltzmann, Vlasov and Related Equations

Elsevier *Boltzmann and Vlasov equations played a great role in the past and still play an important role in modern natural sciences, technique and even philosophy of science. Classical Boltzmann equation derived in 1872 became a cornerstone for the molecular-kinetic theory, the second law of thermodynamics (increasing entropy) and derivation of the basic hydrodynamic equations. After modifications, the fields and numbers of its applications have increased to include diluted gas, radiation, neutral particles transportation, atmosphere optics and nuclear reactor modelling. Vlasov equation was obtained in 1938 and serves as a basis of plasma physics and describes large-scale processes and galaxies in astronomy, star wind theory. This book provides a comprehensive review of both equations and presents both classical and modern applications. In addition, it discusses several open problems of great importance. Reviews the whole field from the beginning to today Includes practical applications Provides classical and modern (semi-analytical) solutions*

Design of Autoreaction

A Framework for Kinetic Reaction at Zero Energy

Springer Nature *This book provides the readers with a timely guide to the application and integration of interdisciplinary principles from the fields of kinetic design, mechanics, energy and materials engineering in the fields of architecture and engineering design. It explores the potential integration of autoreactive solutions, unpowered kinetic systems triggered by changes in the surrounding latent energy conditions, within man-made artefacts with added functionality and efficiency. Related interdisciplinary parameters are explored discussing morphology, mechanics, energy and materials in detail. Each chapter examines the implications of autoreactivity in one specific field, providing a general overview and listing relevant motion design parameters and identifying for the reader those aspects that have a high potential to open up for new design directions. The book guides readers through a highly multidisciplinary field of design, offering an extraordinary resource of knowledge for professional architects, engineers and designers, as well as for university teachers, researchers and students. Interdisciplinary research is presented throughout the book as a powerful resource that*

can serve architecture and design, and a learning method to rethink innovative, optimal and sustainable solutions.

Computing Qualitatively Correct Approximations of Balance Laws

Exponential-Fit, Well-Balanced and Asymptotic-Preserving

Springer Science & Business Media *Substantial effort has been drawn for years onto the development of (possibly high-order) numerical techniques for the scalar homogeneous conservation law, an equation which is strongly dissipative in L1 thanks to shock wave formation. Such a dissipation property is generally lost when considering hyperbolic systems of conservation laws, or simply inhomogeneous scalar balance laws involving accretive or space-dependent source terms, because of complex wave interactions. An overall weaker dissipation can reveal intrinsic numerical weaknesses through specific nonlinear mechanisms: Hugoniot curves being deformed by local averaging steps in Godunov-type schemes, low-order errors propagating along expanding characteristics after having hit a discontinuity, exponential amplification of truncation errors in the presence of accretive source terms... This book aims at presenting rigorous derivations of different, sometimes called well-balanced, numerical schemes which succeed in reconciling high accuracy with a stronger robustness even in the aforementioned accretive contexts. It is divided into two parts: one dealing with hyperbolic systems of balance laws, such as arising from quasi-one dimensional nozzle flow computations, multiphase WKB approximation of linear Schrödinger equations, or gravitational Navier-Stokes systems. Stability results for viscosity solutions of onedimensional balance laws are sketched. The other being entirely devoted to the treatment of weakly nonlinear kinetic equations in the discrete ordinate approximation, such as the ones of radiative transfer, chemotaxis dynamics, semiconductor conduction, spray dynamics or linearized Boltzmann models. “Caseology” is one of the main techniques used in these derivations. Lagrangian techniques for filtration equations are evoked too. Two-dimensional methods are studied in the context of non-degenerate semiconductor models.*

A Civil-Military Response to Hybrid Threats

Springer *This edited volume provides scholars and practitioners with an in-depth examination of the role of civil-military cooperation in addressing hybrid threats. As they combine the simultaneous employment of conventional and non-conventional tools and target not only military objectives but governments and societies at large, hybrid threats cannot be countered solely by military means, but require an equally inclusive response encompassing a wide range of military and civilian actors. This book, which combines the perspectives of academics, military officers, and officials from international and non-governmental organisations, resorts to different case studies to illustrate the importance of civil-military cooperation in enhancing the resilience of NATO members and partners against a wide range of societal destabilization strategies, thereby contributing to the formulation of a civil-military response to hybrid threats.*

Thermodynamic and Kinetic Constraints on Reaction Rates Among Minerals and Aqueous Solutions

Equilibrium and Kinetic Studies in Aqueous Acidic Solutions of Chromium (III), Chromium (VI) and Cerium (IV)

Ion Exchange Technology

Academic Press *Ion Exchange Technology serves both as a reference and as a text book for technologists and engineers. While the present book is based mainly on ion exchange as practiced in the United States, the object was to produce a generally useful book which would deal with the fundamental problems, techniques, and operations of ion exchange such as mass transfer, equipment*

design, properties of ion exchange resins, and deionization. Also include are chapters on two types of applications—those that are used industrially on a large scale, and those which have not yet reached large-scale use but have impressive potentialities. In both the fundamental and applied chapters it was deemed necessary that the successful aspects of ion exchange operation be included. In addition, it was equally important to describe the problems and the inherent complexities encountered in the setting up of an ion exchange process. Wherever possible the economic factors were described realistically.

Nonlinear Partial Differential Equations and Related Analysis

The Emphasis Year 2002-2003 Program on Nonlinear Partial Differential Equations and Related Analysis, September 2002-July 2003, Northwestern University, Evanston, Illinois

American Mathematical Soc. *The Emphasis Year on Nonlinear Partial Differential Equations and Related Analysis at Northwestern University produced this fine collection of original research and survey articles. Many well-known mathematicians attended the events and submitted their contributions for this volume. Eighteen papers comprise this work, representing the most significant advances and current trends in nonlinear PDEs and their applications. Topics covered include elliptic and parabolic equations, Navier Stokes equations, and hyperbolic conservation laws. Important applications are presented from incompressible and compressible fluid mechanics, combustion, and electromagnetism.Also included are articles on recent advances in statistical reliability in modeling, simulation, level set methods for image processing, shock waves, free boundaries, boundary layers, errors in numerical solutions, stability, instability, and singular limits. The volume is suitable for researchers and graduate students interested in partial differential equations.*

Kinetic Theory Solutions for the Spherical Electrostatic Probes in a Stationary Plasma

The Cauchy Problem in Kinetic Theory

SIAM *This volume studies the basic equations of kinetic theory in all of space. It contains up-to-date, state-of-the-art treatments of initial-value problems for the major kinetic equations, including the Boltzmann equation (from rarefied gas dynamics) and the Vlasov-Poisson/Vlasov-Maxwell systems (from plasma physics). This is the only existing book to treat Boltzmann-type problems and Vlasov-type problems together. Although these equations describe very different phenomena, they share the same streaming term. The author proves that solutions starting from a given configuration at an initial time exist for all future times by imposing appropriate hypotheses on the initial values in several important cases. He emphasizes those questions that a mathematician would ask first: Is there a solution to this problem? Is it unique? Can it be numerically approximated? The topics treated include the study of the Boltzmann collision operator, the study of the initial-value problem for the Boltzmann equation with "small" and "near equilibrium" data, global smooth solvability of the initial-value problem for the Vlasov-Poisson system with smooth initial data of unrestricted size, conditions under which the initial-value problem for the Vlasov-Maxwell system has global-in-time solutions (in both the smooth and weak senses), and more.*

Singular Random Dynamics

Cetraro, Italy 2016

Springer Nature *Written by leading experts in an emerging field, this book offers a unique view of the theory of stochastic partial differential equations, with lectures on the stationary KPZ equation, fully nonlinear SPDEs, and random data wave equations. This subject has recently attracted a great deal of attention, partly as a consequence of Martin Hairer's contributions and in particular his creation of a theory of regularity structures for SPDEs, for which he was awarded the Fields Medal in 2014. The text comprises three*

lectures covering: the theory of stochastic Hamilton–Jacobi equations, one of the most intriguing and rich new chapters of this subject; singular SPDEs, which are at the cutting edge of innovation in the field following the breakthroughs of regularity structures and related theories, with the KPZ equation as a central example; and the study of dispersive equations with random initial conditions, which gives new insights into classical problems and at the same time provides a surprising parallel to the theory of singular SPDEs, viewed from many different perspectives. These notes are aimed at graduate students and researchers who want to familiarize themselves with this new field, which lies at the interface between analysis and probability.

The Porous Medium Equation

Mathematical Theory

Oxford University Press *Aimed at research students and academics in mathematics and engineering, as well as engineering specialists, this book provides a systematic and comprehensive presentation of the mathematical theory of the nonlinear heat equation usually called the Porous Medium Equation.*

IUTAM Symposium on Advances in Micro- and Nanofluidics

Proceedings of the IUTAM Symposium on Advances in Micro- and Nanofluidics, Dresden, Germany, September

6-8, 2007

Springer Science & Business Media *Micro and nano-fluidics concerns fluid dynamics occurring in devices or flow configurations with minimum design length measured in micrometers or smaller. The behavior of fluids at these scales is quite different from that at the macroscopic level due to the presence of surface tension effects, wetting phenomena, Brownian diffusion and hydrodynamic interactions with immersed particles and microstructures. These effects cannot be generally represented in a classical homogeneous continuum framework. However, this triggers the development of new tools to investigate and simulate problems at the meso-scopic level. This book contains a collection of works presented at the IUTAM Symposium on Advances on Micro and Nano-fluidics held in Dresden in 2007. It covers several subjects of wide interest for micro and nano-fluidics applications focusing on both, analytical and numerical approaches. Topics covered in particular include multi-scale particle methods for numerical simulations, liquid-wall interactions and modeling approaches, modeling of immersed nano-scale structures, organized flow behavior at micro and nano-scales, and methods for control of micro- and nano-scale flows.*