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KEY=STABILITY - SHANIYA ROBERTS

From Being to Becoming Time and Complexity in the Physical Sciences *W.H. Freeman* **Static and Dynamic Neural Networks From Fundamentals to Advanced Theory** *John Wiley & Sons* **Neuronale Netze haben sich in vielen Bereichen der Informatik und künstlichen Intelligenz, der Robotik, Prozeßsteuerung und Entscheidungsfindung bewährt. Um solche Netze für immer komplexere Aufgaben entwickeln zu können, benötigen Sie solide Kenntnisse der Theorie statischer und dynamischer neuronaler Netze. Aneignen können Sie sie sich mit diesem Lehrbuch! Alle theoretischen Konzepte sind in anschaulicher Weise mit praktischen Anwendungen verknüpft. Am Ende jedes Kapitels können Sie Ihren Wissensstand anhand von Übungsaufgaben überprüfen. Chaotic, Fractional, and Complex Dynamics: New Insights and Perspectives** *Springer* **The book presents nonlinear, chaotic and fractional dynamics, complex systems and networks, together with cutting-edge research on related topics. The fifteen chapters – written by leading scientists working in the areas of nonlinear, chaotic, and fractional dynamics, as well as complex systems and networks – offer an extensive overview of cutting-edge research on a range of topics, including fundamental and applied research. These include but are not limited to, aspects of synchronization in complex dynamical systems, universality features in systems with specific fractional dynamics, and chaotic scattering. As such, the book provides an excellent and timely snapshot of the current state of research, blending the insights and experiences of many prominent researchers. Multiscale Thermo-Dynamics Introduction to GENERIC** *Walter de Gruyter GmbH & Co KG* **One common feature of new emerging technologies is the fusion of the very small (nano) scale and the large scale engineering. The classical environment provided by single scale theories, as for instance by the classical hydrodynamics, is not anymore satisfactory. The main challenge is to keep the important details while still be able to keep the overall picture and simplicity. It is the thermodynamics that addresses this challenge. Our main reason for writing this book is to explain such general viewpoint of thermodynamics and to illustrate it on a very wide range of examples. Contents Levels of description Hamiltonian mechanics Irreversible evolution Reversible and irreversible evolution Multicomponent systems Contact geometry Appendix: Mathematical aspects Stability and Boundary Stabilization of 1-D Hyperbolic Systems** *Birkhäuser* **This monograph explores the modeling of conservation and balance laws of one-dimensional hyperbolic systems using partial differential equations. It presents typical examples of hyperbolic systems for a wide range of physical engineering applications, allowing readers to understand the concepts in whichever setting is most familiar to them. With these examples, it also illustrates how control boundary conditions may be defined for the most commonly used control devices. The authors begin with the simple case of systems of two linear conservation laws and then consider the stability of systems under more general boundary conditions that may be differential, nonlinear, or switching. They then extend their discussion to the case of nonlinear conservation laws and demonstrate the use of Lyapunov functions in this type of analysis. Systems of balance laws are considered next, starting with the linear variety before they move on to more general cases of nonlinear ones. They go on to show how the problem of boundary stabilization of systems of two balance laws by both full-state and dynamic output feedback in observer-controller form is solved by using a “backstepping” method, in which the gains of the feedback laws are solutions of an associated system of linear hyperbolic PDEs. The final chapter presents a case study on the control of navigable rivers to emphasize the main technological features that may occur in real live applications of boundary feedback control. Stability and Boundary Stabilization of 1-D Hyperbolic Systems will be of interest to graduate students and researchers in applied mathematics and control engineering. The wide range of applications it discusses will help it to have as broad an appeal within these groups as possible. Proceedings of the 26th IEEE Conference on Decision and Control December 9-11, 1987, Westin Century-Plaza Hotel, Los Angeles, California Nonequilibrium and Irreversibility** *Springer* **This book concentrates on the properties of the stationary states in chaotic systems of particles or fluids, leaving aside the theory of the way they can be reached. The stationary states of particles or of fluids (understood as probability distributions on microscopic configurations or on the fields describing continua) have received important new ideas and data from numerical simulations and reviews are needed. The starting point is to find out which time invariant distributions come into play in physics. A special feature of this book is the historical approach. To identify the problems the author analyzes the papers of the founding fathers Boltzmann, Clausius and Maxwell including translations of the relevant (parts of) historical documents. He also establishes a close link between treatment of irreversible phenomena in statistical mechanics and the theory of chaotic systems at and beyond the onset of turbulence as developed by Sinai, Ruelle, Bowen (SRB) and others: the author gives arguments intending to support strongly the viewpoint that stationary states in or out of equilibrium can be described in a unified way. In this book it is the "chaotic hypothesis", which can be seen as an extension of the classical ergodic hypothesis to non equilibrium phenomena, that plays the central role. It is shown that SRB - often considered as a kind of mathematical playground with no impact on physical reality - has indeed a sound physical interpretation; an observation which to many might be new and a very welcome insight. Following this, many consequences of the chaotic hypothesis are analyzed in chapter 3 - 4 and in chapter 5 a few applications are proposed. Chapter 6 is historical: carefully analyzing the old literature on the subject, especially ergodic theory and its relevance for statistical mechanics; an approach which gives the book a very personal touch. The book contains an extensive coverage of current research (partly from the authors and his coauthors publications) presented in enough detail so that advanced students may get the flavor of a direction of research in a field which is still very much alive and progressing. Proofs of theorems are usually limited to heuristic sketches privileging the presentation of the ideas and providing references that the reader can follow, so that in this way an overload of this text with technical details could be avoided. Invariant Manifolds for Physical and Chemical Kinetics** *Springer Science & Business Media* **By bringing together various ideas and methods for extracting the slow manifolds, the authors show that it is possible to establish a more macroscopic description in nonequilibrium systems. The book treats slowness as stability. A unifying geometrical viewpoint of the thermodynamics of slow and fast motion enables the development of reduction techniques, both analytical and numerical. Examples considered in the book range from the Boltzmann kinetic equation and hydrodynamics to the Fokker-Planck equations of polymer dynamics and models of chemical kinetics describing oxidation reactions. Special chapters are devoted to model reduction in classical statistical dynamics, natural selection, and exact solutions for slow hydrodynamic manifolds. The book will be a major reference source for both theoretical and applied model reduction. Intended primarily as a postgraduate-level text in nonequilibrium kinetics and model reduction, it will also be valuable to PhD students and researchers in applied mathematics, physics and various fields of engineering. Processing Networks Fluid Models and Stability** *Cambridge University Press* **The state of the art in fluid-based methods for stability analysis, giving researchers and graduate students command of the tools. Complex and Adaptive Dynamical Systems A Primer** *Springer* **This primer offers readers an introduction to the central concepts that form our modern understanding of complex and emergent behavior, together with detailed coverage of accompanying mathematical methods. All calculations are presented step by step and are easy to follow. This new fourth edition has been fully reorganized and includes new chapters, figures and exercises. The core aspects of modern complex system sciences are presented in the first chapters, covering network theory, dynamical systems, bifurcation and catastrophe theory, chaos and adaptive processes, together with the principle of self-organization in reaction-diffusion systems and social animals. Modern information theoretical principles are treated in further chapters, together with the concept of self-organized criticality, gene regulation networks, hypercycles and coevolutionary avalanches, synchronization phenomena, absorbing phase transitions and the cognitive system approach to the brain. Technical course prerequisites are the standard mathematical tools for an advanced undergraduate course in the natural sciences or engineering. Each chapter includes exercises and suggestions for further reading, and the solutions to all exercises are provided in the last chapter. From the reviews of previous editions: This is a very interesting introductory book written for a broad audience of graduate students in natural sciences and engineering. It can be equally well used both for teac hing and self-education. Very well structured and every topic is illustrated with simple and motivating examples. This is a true guidebook to the world of complex nonlinear phenomena. (Ilya Pavlyukevich, Zentralblatt MATH, Vol. 1146, 2008) Claudius Gros’ Complex and Adaptive Dynamical Systems: A Primer is a welcome addition to the literature. A particular strength of the book is its emphasis on analytical techniques for studying complex systems. (David P. Feldman, Physics Today, July, 2009). Linear Matrix Inequalities in System and Control Theory** *SIAM* **In this book the authors reduce a wide variety of problems arising in system and control theory to a handful of convex and quasiconvex optimization problems that involve linear matrix inequalities. These optimization problems can be solved using recently developed numerical algorithms that not only are polynomial-time but also work very well in practice; the reduction therefore can be considered a solution to the original problems. This book opens up an important new research area in which convex optimization is combined with system and control theory, resulting in the solution of a large number of previously unsolved problems. Port-Hamiltonian Systems Theory An Introductory Overview Port-Hamiltonian Systems Theory: An Introductory Overview provides a concise and easily accessible description of the foundations underpinning the subject and emphasizes novel developments in the field, which will be of interest to a broad range of researchers. Mathematical Reviews Physics of Continuous Matter, Second Edition Exotic and Everyday Phenomena in the Macroscopic World** *CRC Press* **Physics of Continuous Matter: Exotic and Everyday Phenomena in the Macroscopic World, Second Edition provides an introduction to the basic ideas of continuum physics and their application to a wealth of macroscopic phenomena. The text focuses on the many approximate methods that offer insight into the rich physics hidden in fundamental continuum mechanics equations. Like its acclaimed predecessor, this second edition introduces mathematical tools on a "need-to-know" basis. New to the Second Edition This edition includes three new chapters on elasticity of slender rods, energy, and entropy. It also offers more margin drawings and photographs and improved images of simulations. Along with reorganizing much of the material, the author has revised many of the physics arguments and mathematical presentations to improve clarity and consistency. The collection of problems at the end of each chapter has been expanded as well. These problems further develop the physical and mathematical concepts presented. With worked examples throughout, this book clearly illustrates both qualitative and quantitative physics reasoning. It emphasizes the importance in understanding the physical principles behind equations**

and the conditions underlying approximations. A companion website provides a host of ancillary materials, including software programs, color figures, and additional problems. Bioengineering and Biomedical Signal and Image Processing First International Conference, BIOMESIP 2021, Meloneras, Gran Canaria, Spain, July 19-21, 2021, Proceedings *Springer Nature* **This book constitutes the refereed proceedings of the First International Conference on Bioengineering and Biomedical Signal and Image Processing, BIOMESIP 2021, held in Meloneras, Gran Canaria, Spain, in July 2021. The 41 full and 5 short papers were carefully reviewed and selected from 121 submissions. The papers are grouped in topical issues on biomedical applications in molecular, structural, and functional imaging; biomedical computing; biomedical signal measurement, acquisition and processing; computerized medical imaging and graphics; disease control and diagnosis; neuroimaging; pattern recognition and machine learning for biosignal data; personalized medicine; and COVID-19. Emergence of Dynamical Order Synchronization Phenomena in Complex Systems** *World Scientific* **Large populations of interacting active elements, periodic or chaotic, can undergo spontaneous transitions to dynamically ordered states. These collective states are characterized by self-organized coherence revealed by full mutual synchronization of individual dynamics or the formation of multiple synchronous clusters. Such self-organization phenomena are essential for the functioning of complex systems of various origins, both natural and artificial. This book provides a detailed introduction to the theory of collective synchronization phenomena in large complex systems. Transitions to dynamical clustering and synchronized states are systematically discussed. Such concepts as dynamical order parameters, glass like behavior and hierarchical organization are presented. Adaptive Control of Nonsmooth Dynamic Systems** *Springer Science & Business Media* **Many of the non-smooth, non-linear phenomena covered in this well-balanced book are of vital importance in almost any field of engineering. Contributors from all over the world ensure that no one area's slant on the subjects predominates. Nonlinear Dynamical Systems with Self-Excited and Hidden Attractors** *Springer* **This book highlights the latest findings on nonlinear dynamical systems including two types of attractors: self-excited and hidden attractors. Further, it presents both theoretical and practical approaches to investigating nonlinear dynamical systems with self-excited and hidden attractors. The book includes 20 chapters contributed by respected experts, which focus on various applications such as biological systems, memristor-based systems, fractional-order systems, finance systems, business cycles, oscillators, coupled systems, hyperchaotic systems, flexible robot manipulators, electronic circuits, and control models. Special attention is given to modeling, design, circuit realization, and practical applications to address recent research problems in nonlinear dynamical systems. The book provides a valuable reference guide to nonlinear dynamical systems for engineers, researchers, and graduate students, especially those whose work involves mechanics, electrical engineering, and control systems. Viability Theory New Directions** *Springer Science & Business Media* **Viability theory designs and develops mathematical and algorithmic methods for investigating the adaptation to viability constraints of evolutions governed by complex systems under uncertainty that are found in many domains involving living beings, from biological evolution to economics, from environmental sciences to financial markets, from control theory and robotics to cognitive sciences. It involves interdisciplinary investigations spanning fields that have traditionally developed in isolation. The purpose of this book is to present an initiation to applications of viability theory, explaining and motivating the main concepts and illustrating them with numerous numerical examples taken from various fields. Nonlinear Spatio-Temporal Dynamics and Chaos in Semiconductors** *Cambridge University Press* **Concepts from semiconductor physics, nonlinear-dynamics and chaos brought together to examine semiconductor transport phenomena. Nonlinear Dynamics of Nanosystems** *John Wiley & Sons* **A discussion of the fundamental changes that occur when dynamical systems from the fields of nonlinear optics, solids, hydrodynamics and biophysics are scaled down to nanosize. The authors are leading scientists in the field and each of their contributions provides a broader introduction to the specific area of research. In so doing, they include both the experimental and theoretical point of view, focusing especially on the effects on the nonlinear dynamical behavior of scaling, stochasticity and quantum mechanics. For everybody working on the synthesis and integration of nanoscopic devices who sooner or later will have to learn how to deal with nonlinear effects. Collected Papers of L.D. Landau** *Elsevier* **Collected Papers of L. D. Landau brings together the collected papers of L. D. Landau in the field of physics. The discussion is divided into the following sections: low-temperature physics (including superconductivity); solid-state physics; plasma physics; hydrodynamics; astrophysics; nuclear physics and cosmic rays; quantum mechanics; quantum field theory; and miscellaneous works. Topics covered include the intermediate state of supraconductors; the absorption of sound in solids; the properties of metals at very low temperatures; and production of showers by heavy particles. This volume is comprised of 100 chapters and begins with Landau's paper on the theory of the spectra of diatomic molecules, followed by his studies on the damping problem in wave mechanics; quantum electrodynamics in configuration space; electron motion in crystal lattices; and the internal temperature of stars. Some of Landau's theories, such as those of stars, energy transfer on collisions, phase transitions, and specific heat anomalies are discussed. Subsequent chapters focus on the structure of the undisplaced scattering line; the transport equation in the case of Coulomb interactions; scattering of light by light; and the origin of stellar energy. This book will be a valuable resource for physicists as well as physics students and researchers. Switching in Systems and Control** *Springer Science & Business Media* **The theory of switched systems is related to the study of hybrid systems, which has gained attention from control theorists, computer scientists, and practicing engineers. This book examines switched systems from a control-theoretic perspective, focusing on stability analysis and control synthesis of systems that combine continuous dynamics with switching events. It includes a vast bibliography and a section of technical and historical notes. Physics Briefs Physikalische Berichte Nonlinear Dynamics Integrability, Chaos and Patterns** *Springer Science & Business Media* **This self-contained treatment covers all aspects of nonlinear dynamics, from fundamentals to recent developments, in a unified and comprehensive way. Numerous examples and exercises will help the student to assimilate and apply the techniques presented. International Aerospace Abstracts Progress in Motor Control A Multidisciplinary Perspective** *Springer Science & Business Media* **This ground-breaking book brings together researchers from a wide range of disciplines to discuss the control and coordination of processes involved in perceptually guided actions. The research area of motor control has become an increasingly multidisciplinary undertaking. Understanding the acquisition and performance of voluntary movements in biological and artificial systems requires the integration of knowledge from a variety of disciplines from neurophysiology to biomechanics. Nonlinear Oscillations and Waves in Dynamical Systems** *Springer Science & Business Media* **A rich variety of books devoted to dynamical chaos, solitons, self-organization has appeared in recent years. These problems were all considered independently of one another. Therefore many of readers of these books do not suspect that the problems discussed are divisions of a great generalizing science - the theory of oscillations and waves. This science is not some branch of physics or mechanics, it is a science in its own right. It is in some sense a meta-science. In this respect the theory of oscillations and waves is closest to mathematics. In this book we call the reader's attention to the present-day theory of non-linear oscillations and waves. Oscillatory and wave processes in the systems of diversified physical natures, both periodic and chaotic, are considered from a unified poin t of view . The relation between the theory of oscillations and waves, non-linear dynamics and synergetics is discussed. One of the purposes of this book is to convince reader of the necessity of a thorough study popular branches of of the theory of oscillat ions and waves, and to show that such science as non-linear dynamics, synergetics, soliton theory, and so on, are, in fact , constituent parts of this theory. The primary audiences for this book are researchers having to do with oscillatory and wave processes, and both students and post-graduate students interested in a deep study of the general laws and applications of the theory of oscillations and waves. Origins Brain and Self Organization** *Routledge* **The result of the second Appalachian conference on neurodynamics, this volume focuses on the problem of "order," its origins, evolution, and future. Central to this concern lies our understanding of time. Both classical and quantum physics have developed their conceptions within a framework of time symmetry. Divided into four major sections, this book: * provides refreshingly new approaches to the problem of the evolution of order, indicating the directions that need to be taken in subsequent conferences which will address learning and memory more directly; * addresses the issue of how information becomes transmitted in the nervous system; * shows how patterns are constructed at the synaptodendritic level of processing and how such pattern construction relates to image processing; and * deals with the control operations which operate on image processing to construct entities such as visual and auditory objects such as phonemes. The aim of the conference was to bring together professionals to exchange ideas -- some were fairly worked out; others were in their infancy. As a result, one of the most valuable aspects of the conference is that it fostered lasting interactive relationships among these leading researchers. 13th International Conference on Theory and Application of Fuzzy Systems and Soft Computing — ICAFS-2018** *Springer* **This book presents the proceedings of the 13th International Conference on Application of Fuzzy Systems and Soft Computing (ICAFS 2018), held in Warsaw, Poland on August 27–28, 2018. It includes contributions from diverse areas of soft computing such as uncertain computation, Z-information processing, neuro-fuzzy approaches, evolutionary computing and others. The topics of the papers include theory of uncertainty computation; theory and application of soft computing; decision theory with imperfect information; neuro-fuzzy technology; image processing with soft computing; intelligent control; machine learning; fuzzy logic in data analytics and data mining; evolutionary computing; chaotic systems; soft computing in business, economics and finance; fuzzy logic and soft computing in the earth sciences; fuzzy logic and soft computing in engineering; soft computing in medicine, biomedical engineering and the pharmaceutical sciences; and probabilistic and statistical reasoning in the social and educational sciences. The book covers new ideas from theoretical and practical perspectives in economics, business, industry, education, medicine, the earth sciences and other fields. In addition to promoting the development and application of soft computing methods in various real-life fields, it offers a useful guide for academics, practitioners, and graduates in fuzzy logic and soft computing fields. Shell-like Structures Advanced Theories and Applications** *Springer* **The book presents mathematical and mechanical aspects of the theory of plates and shells, applications in civil, aero-space and mechanical engineering, as well in other areas. The focus relates to the following problems:• comprehensive review of the most popular theories of plates and shells,• relations between three-dimensional theories and two-dimensional ones,• presentation of recently developed new refined plates and shells theories (for example, the micropolar theory or gradient-type theories),• modeling of coupled effects in shells and plates related to electromagnetic and temperature fields, phase transitions, diffusion, etc.,• applications in modeling of non-classical objects like, for example, nanostructures,• presentation of actual numerical tools based on the finite element approach. Turbulence in Magnetohydrodynamics** *Walter de Gruyter GmbH & Co KG* **Magnetohydrodynamics describes dynamics in electrically conductive fluids. These occur in our environment as well as in our atmosphere and magnetosphere, and play a role in the sun's interaction with our planet. In most cases these phenomena involve turbulences, and thus are very challenging to understand and calculate. A sound knowledge is needed to tackle these problems. This work gives the basic information on turbulence in nature, comtaining the needed equations, notions and numerical simulations. The current state of our knowledge and future implications of MHD turbulence are outlined systematically. It is indispensable for all scientists engaged in research of our atmosphere and in space science. Stability Regions of Nonlinear Dynamical Systems Theory, Estimation, and Applications** *Cambridge University Press* **An authoritative treatment by leading researchers covering theory and optimal estimation, along with practical applications. Cooperative Control of Multi-Agent Systems Optimal and Adaptive Design Approaches** *Springer Science & Business Media* **Cooperative Control of Multi-Agent Systems extends optimal control and adaptive control design methods to multi-agent systems on communication graphs. It develops Riccati design techniques for general linear dynamics for cooperative state feedback design, cooperative observer design, and cooperative dynamic output feedback design. Both continuous-time and discrete-time dynamical multi-agent systems are treated. Optimal cooperative control is introduced and neural adaptive design techniques for multi-agent nonlinear systems with unknown dynamics, which are rarely treated in literature are developed. Results spanning systems with first-, second- and on up to general high-order nonlinear dynamics are presented. Each control methodology proposed is developed by rigorous proofs. All algorithms are justified by simulation examples. The text is self-contained and will serve as an excellent comprehensive source of information for researchers and graduate students**

working with multi-agent systems. Partially Observed Markov Decision Processes *Cambridge University Press* **This book covers formulation, algorithms, and structural results of partially observed Markov decision processes, whilst linking theory to real-world applications in controlled sensing. Computations are kept to a minimum, enabling students and researchers in engineering, operations research, and economics to understand the methods and determine the structure of their optimal solution. Mathematics for Physics A Guided Tour for Graduate Students** *Cambridge University Press* **An engagingly-written account of mathematical tools and ideas, this book provides a graduate-level introduction to the mathematics used in research in physics. The first half of the book focuses on the traditional mathematical methods of physics – differential and integral equations, Fourier series and the calculus of variations. The second half contains an introduction to more advanced subjects, including differential geometry, topology and complex variables. The authors' exposition avoids excess rigor whilst explaining subtle but important points often glossed over in more elementary texts. The topics are illustrated at every stage by carefully chosen examples, exercises and problems drawn from realistic physics settings. These make it useful both as a textbook in advanced courses and for self-study. Password-protected solutions to the exercises are available to instructors at www.cambridge.org/9780521854030. Nonlinear Dynamics And Chaos** *Addison Wesley Publishing Company* **This essential handbook provides the theoretical and experimental tools necessary to begin researching the nonlinear behavior of mechanical, electrical, optical, and other systems. The book describes several nonlinear systems which are realized by desktop experiments, such as an apparatus showing chaotic string vibrations, an LRC circuit displaying strange scrolling patterns, and a bouncing ball machine illustrating the period doubling route to chaos. Fractal measures, periodic orbit extraction, and symbolic analysis are applied to unravel the chaotic motions of these systems. The simplicity of the examples makes this an excellent book for undergraduate and graduate-level physics and mathematics courses, new courses in dynamical systems, and experimental laboratories. Nonlinear Dynamics A Concise Introduction Interlaced with Code** *Springer* **This concise and up-to-date textbook provides an accessible introduction to the core concepts of nonlinear dynamics as well as its existing and potential applications. The book is aimed at students and researchers in all the diverse fields in which nonlinear phenomena are important. Since most tasks in nonlinear dynamics cannot be treated analytically, skills in using numerical simulations are crucial for analyzing these phenomena. The text therefore addresses in detail appropriate computational methods as well as identifying the pitfalls of numerical simulations. It includes numerous executable code snippets referring to open source Julia software packages. Each chapter includes a selection of exercises with which students can test and deepen their skills. Non-equilibrium Thermodynamics and Physical Kinetics** *De Gruyter* **This graduate textbook covers contemporary directions of non-equilibrium statistical mechanics as well as classical methods of kinetics. With one of the main propositions being to avoid terms such as "obviously" and "it is easy to show," this treatise is an easy-to-read introduction into this traditional, yet vibrant field. Robot Analysis and Control** *John Wiley & Sons* **Introduces the basic concepts of robot manipulation--the fundamental kinematic and dynamic analysis of manipulator arms, and the key techniques for trajectory control and compliant motion control. Material is supported with abundant examples adapted from successful industrial practice or advanced research topics. Includes carefully devised conceptual diagrams, discussion of current research topics with references to the latest publications, and end-of-book problem sets. Appendixes. Bibliography.**