Dynamical Systems Stability Theory And Applications Lecture Notes In Mathematics

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Stability of Dynamical Systems Cambridge University Press
Several distinctive aspects make Dynamical Systems unique, including: treating the subject from a mathematical perspective with the proofs of most of the results included providing a careful review of background materials introducing ideas through examples and at a level accessible to a beginning graduate student
Bifurcation and Stability in Nonlinear Dynamical Systems Springer Nature
"Illuminates the most important results of the Lyapunov and Lagrange stability theory for a general class of dynamical systems by developing topics in a metric space independantly of equations, inequalities, or inclusions. Applies the general theory to specific classes of equations. Presents new and expanded material on the stability analysis of hybrid dynamical systems and dynamical systems with discontinuous dynamics."
Stability of Dynamical Systems John Wiley & Sons
Filling a gap in the literature, this volume offers the first comprehensive analysis of all the major types of system models. Throughout the text, there are many examples and applications to important classes of systems in areas such as power and energy, feedback control, artificial neural networks, digital signal processing and control, manufacturing, computer networks, and socio-economics. Replete with exercises and requiring basic knowledge of linear algebra, analysis, and differential equations, the work may be used as a textbook for graduate courses in stability theory of dynamical systems. The book may also serve as a self-study reference for graduate students, researchers, and practitioners in a huge variety of fields.
The Stability of Dynamical Systems CRC-Press
This book systematically presents a fundamental theory for the local analysis of bifurcation and stability of equilibriums in nonlinear dynamical systems. Until now, one does not have any efficient way to investigate stability and bifurcation of dynamical systems with higher-order singularity equilibriums. For instance, infinite-equilibrium dynamical systems have higher-order singularity, which dramatically changes dynamical behaviors and possesses the similar characteristics of discontinuous dynamical systems. The stability and bifurcation of equilibriums on the specific eigenvector are presented, and the spiral stability and Hopf bifurcation of equilibriums in nonlinear systems are presented through the Fourier series transformation. The bifurcation and stability of higher-order singularity equilibriums are presented through the (2m)th and (2m+1)th -degree polynomial systems. From local analysis, dynamics of infinite-equilibrium systems is discussed. The research on infinite-equilibrium systems will bring us to the new era of dynamical systems and control. Presents an efficient way to investigate stability and bifurcation of dynamical systems with higher-order singularity equilibriums; Discusses dynamics of infinite-equilibrium systems; Demonstrates higher-order singularity.
Stability Theory And Related Topics In Dynamical Systems Springer Science & Business Media

Dynamical Systems: Stability Theory and ApplicationsSpringerStability Theory of Dynamical SystemsSpringer Science & Business Media
Qualitative Theory of Dynamical Systems Springer Science & Business Media
This authoritative treatment covers theory, optimal estimation and a range of practical applications. The first book on the subject, and written by leading researchers, this clear and rigorous work presents a comprehensive theory for both the stability boundary and the stability regions of a range of nonlinear dynamical systems including continuous, discrete, complex, two-time-scale and non-hyperbolic systems, illustrated with numerical examples. The authors also propose new concepts of quasi-stability region and of relevant stability regions and their complete characterisations. Optimal schemes for estimating stability regions of general nonlinear dynamical systems are also covered, and finally the authors describe and explain how the theory is applied in applications including direct methods for power system transient stability analysis, nonlinear optimisation for finding a set of high-quality optimal solutions, stabilisation of nonlinear systems, ecosystem dynamics, and immunisation problems.
Nonlinear Dynamical Systems and Control Princeton University Press
The 11th International Workshop on Dynamics and Control brought together scientists and engineers from diverse fields and gave them a venue to develop a greater understanding of this discipline and how it relates to many areas in science, engineering, economics, and biology. The event gave researchers an opportunity to investigate ideas and techniq
Introduction to Mathematical Systems Theory Princeton University Press
An introduction to nonlinear differential equations which equips undergraduate students with the know-how to appreciate stability theory and bifurcation.
Stability and Control of Large-Scale Dynamical Systems Springer
There are plenty of challenging and interesting problems open for investigation in the field of switched systems. Stability issues help to generate many complex nonlinear dynamic behaviors within switched systems. The authors present a thorough investigation of stability effects on three broad classes of switching mechanism: arbitrary switching where stability represents robustness to unpredictable and undesirable perturbation, constrained switching, including random (within a known stochastic distribution), dwell-time (with a known minimum duration for each subsystem) and autonomously-generated (with a pre-assigned mechanism) switching; and designed switching in which a measurable and freely-assigned switching mechanism contributes to stability by acting as a control input. For each of these classes this book propounds: detailed stability analysis and/or design, related robustness and performance issues, connections to other control problems and many motivating and illustrative examples.
Stability Theory and Applications CRC Press
There has been much excitement over the emergence of new mathematical techniques for the analysis and control of nonlinear systems. In addition, great technological advances have bolstered the impact of analytic advances and produced many new problems and applications which are nonlinear in an essential way. This book lays out in a concise mathematical framework the tools and methods of analysis which underlie this diversity of applications.
Nonlinear Systems CreateSpace
Reprint of classic reference work. Over 400 books have been published in the series Classics in Mathematics, many remain standard references for their subject. All books in this series are reissued in a new, inexpensive softcover edition to make them easily accessible to younger generations of students and researchers. "... The book has many good points: clear organization, historical notes and references at the end of every chapter, and an excellent bibliography. The text is well-written, at a level appropriate for the intended audience, and it represents a very good introduction to the basic theory of dynamical systems."
Dynamical systems Elsevier
An introduction to aspects of the theory of dynamical systems based on extensions of Liapunov's direct method. The main ideas and structure for the theory are presented for difference equations and for the analogous theory for ordinary differential equations and retarded functional differential equations.
Dynamical Systems CRC Press
Several distinctive aspects make Dynamical Systems unique, including: treating the subject from a mathematical perspective with the proofs of most of the results included; providing a careful review of background materials; introducing ideas through examples and at a level accessible to a beginning graduate student; focusing on multidimensional systems of real variables. The book treats the dynamics of both iteration of functions and solutions of ordinary differential equations. Many concepts are first introduced for iteration of functions where the geometry is simpler, but results are interpreted for differential equations. The dynamical systems approach of the book concentrates on properties of the whole system or subsets of the system rather than individual solutions. The more local theory discussed deals with characterizing types of solutions under various hypothesis, and later chapters address more global aspects. What's New in the Second Edition?: A revised discussion of the saddle node bifurcation; a new section on the horseshoe for a flow with a transverse homoclinic point; material on horseshoes for nontransverse homoclinic points, indicating recent extensions to the understanding of how horseshoes arise; information proving the ergodicity of a hyperbolic toral automorphism; a new chapter on Hamiltonian systems.
Stability, Symbolic Dynamics and Chaos Cambridge University Press
Hybrid dynamical systems exhibit continuous and instantaneous changes, having features of continuous-time and discrete-time dynamical systems. Filled with a wealth of examples to illustrate concepts, this book presents a complete theory of robust asymptotic stability for hybrid dynamical systems that is applicable to the design of hybrid control algorithms--algorithms that feature logic, timers, or combinations of digital and analog components. With the tools of modern mathematical analysis, Hybrid Dynamical Systems unifies and generalizes earlier developments in continuous-time and discrete-time nonlinear systems. It presents hybrid system versions of the necessary and sufficient Lyapunov conditions for asymptotic stability, invariance principles, and approximation techniques, and examines the robustness of asymptotic stability, motivated by the goal of designing robust hybrid control algorithms. This self-contained and classroom-tested book requires standard background in mathematical analysis and differential equations or nonlinear systems. It will interest graduate students in engineering as well as students and researchers in control, computer science, and mathematics.
Stability Theory Springer Science & Business Media
Nonlinear Dynamical Systems and Control presents and develops an extensive treatment of stability analysis and control design of nonlinear dynamical systems, with an emphasis on Lyapunov-based methods. Dynamical system theory lies at the heart of mathematical sciences and engineering. The application of dynamical systems has crossed interdisciplinary boundaries from chemistry to biochemistry to chemical kinetics, from medicine to biology to population genetics, from economics to sociology to psychology, and from physics to mechanics to engineering. The increasingly complex nature of engineering systems requiring feedback control to obtain a desired system behavior also gives rise to dynamical systems. Wassim Haddad and VijaySekhar Chellaboina provide an exhaustive treatment of nonlinear systems theory and control using the highest standards of exposition and rigor. This graduate-level textbook goes well beyond standard treatments by developing Lyapunov stability theory, partial stability, boundedness, input-to-state stability, input-output stability, finite-time stability, semistability, stability of sets and periodic orbits, and stability theorems via vector Lyapunov functions. A complete and thorough treatment of dissipativity theory, absolute stability theory, stability of feedback systems, optimal control, disturbance rejection control, and robust control for nonlinear dynamical systems is also given. This book is an indispensable resource for applied mathematicians, dynamical systems theorists, control theorists, and engineers.
Hybrid Dynamical Systems Springer Science & Business Media
These notes are the result of a course in dynamical systems given at Orsay during the 1976-77 academic year. I had given a similar course at the Gradu ate Center of the City University of New York the previous year and came to France equipped with the class notes of two of my students there, Carol Hurwitz and Michael Maller. My goal was to present Smale's n-Stability Theorem as completely and compactly as possible and in such a way that the students would have easy access to the literature. I was not confident that I could do all this in lectures in French, so I decided to distribute lecture notes. I wrote these notes in English and Remi Langevin translated them into French. His work involved much more than translation. He consistently corrected for style, clarity, and accuracy. Albert Fathi got involved in reading the manuscript. His role quickly expanded to extensive rewriting and writing. Fathi wrote (5. 1) and (5. 2) and rewrote Theorem 7. 8 when I was in despair of ever getting it right with all the details. He kept me honest at all points and played a large role in the final form of the manuscript. He also did the main work in getting the manuscript ready when I had left France and Langevin was unfortunately unavailable. I ran out of steam by the time it came to Chapter 10. M.
Dynamical Systems Springer-Verlag
Thought-provoking and accessible in approach, this updated and expanded second edition of the Overview of Stability Theory Of Large Scale Dynamical Systems provides a user-friendly introduction to the subject, Taking a clear structural framework, it guides the reader through the subject's core elements. A flowing writing style combines with the use of illustrations and diagrams throughout the text to ensure the reader understands even the most complex of concepts. This succinct and enlightening overview is a required reading for advanced graduate-level students. We hope you find this book useful in shaping your future career. Feel free to send us your enquiries related to our publications to info@smpress.co.uk
Qualitative Theory of Dynamical Systems CRC Press
Modern complex large-scale dynamical systems exist in virtually every aspect of science and engineering, and are associated with a wide variety of physical, technological, environmental, and social phenomena, including aerospace, power, communications, and network systems, to name just a few. This book develops a general stability analysis and control design framework for nonlinear large-scale interconnected dynamical systems, and presents the most complete treatment on vector Lyapunov function methods, vector dissipativity theory, and decentralized control architectures. Large-scale dynamical systems are strongly interconnected and consist of interacting subsystems exchanging matter, energy, or information with the environment. The sheer size, or dimensionality, of these systems necessitates decentralized analysis and control system synthesis methods for their analysis and design. Written in a theorem-proof format with examples to illustrate new concepts, this book addresses continuous-time, discrete-time, and hybrid large-scale systems. It develops finite-time stability and finite-time decentralized stabilization, thermodynamic modeling, maximum entropy control, and energy-based decentralized control. This book will interest applied mathematicians, dynamical systems theorists, control theorists, and engineers, and anyone seeking a fundamental and comprehensive understanding of large-scale interconnected dynamical systems and control.
Dynamical Systems: Stability Theory and Application Springer Science & Business Media
"Illuminates the most important results of the Lyapunov and Lagrange stability theory for a general class of dynamical systems by developing topics in a metric space independantly of equations, inequalities, or inclusions. Applies the general theory to specific classes of equations. Presents new and expanded material on the stability analysis of hybrid dynamical systems and dynamical systems with discontinuous dynamics."
Stability, Instability and Chaos Dynamical Systems: Stability Theory and Applications
Since their inception, the Perspectives in Logic and Lecture Notes in Logic series have published seminal works by leading logicians. Many of the original books in the series have been unavailable for years, but they are now in print once again. Stability theory was introduced and matured in the 1960s and 1970s. Today stability theory influences and is influenced by number theory, algebraic group theory, Riemann surfaces, and representation theory of modules. There is little model theory today that does not involve the methods of stability theory. In this volume, the fourth publication in the Perspectives in Logic series, Steven Buechler bridges the gap between a first-year graduate logic course and research papers in stability theory. The book prepares the student for research in any of today's branches of stability theory, and gives an introduction to classification theory with an exposition of Morley's Categoricity Theorem.

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