

Singularities And Groups In Bifurcation Theory I

Topics in Bifurcation Theory and Applications
Bifurcation Theory and Applications
Bifurcation Theory Elements of Applied Bifurcation Theory
Bifurcation Theory And Methods Of Dynamical Systems
Bifurcation Theory and Methods of Dynamical Systems
Bifurcation Theory with Applications
Bifurcations and Groups in Bifurcation Theory
Bifurcation Theory of Impulsive Dynamical Systems
Singularities and Groups in Bifurcation Theory
Elements of Applied Bifurcation Theory
Topics In Bifurcation Theory And Applications (2nd Edition)
Bifurcation Theory, Mechanics and Physics
Bifurcation Theory Singularities and Groups in Bifurcation Theory
topics in bifurcation theory and applications second edition.
Nonlinear Stability and Bifurcation Theory
Singularities and Groups in Bifurcation Theory
Elements of Applied Bifurcation Theory
Group Theoretic Methods in Bifurcation Theory
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this textbook presents modern techniques of local bifurcation theory of vector fields
the first part reviews the center manifold theory and introduces a constructive
approach of normal forms with many examples basic bifurcations as saddle node
pitchfork and hopf are studied together with bifurcations in the presence of
symmetries special attention is given to examples with reversible vector fields the
second part deals with the couette taylor hydrodynamical instability problem
between concentric rotating cylinders when the rotation rates are varied primary
bifurcations to taylor vortex flow spirals and ribbons are studied and secondary
bifurcations are presented as illustrations of bifurcations from group orbits of
solutions the third part analyses bifurcations from periodic solutions i e perturbations
of an autonomous vector field having a closed orbit same tools are used and studies
of period doubling as well as arnold s resonance tongues are included

this book covers comprehensive bifurcation theory and its applications to dynamical
systems and partial differential equations pdes from science and engineering
including in particular pdes from physics chemistry biology and hydrodynamics the
book first introduces bifurcation theories recently developed by the authors on
steady state bifurcation for a class of nonlinear problems with even order
nondegenerate nonlinearities regardless of the multiplicity of the eigenvalues and
on attractor bifurcations for nonlinear evolution equations a new notion of
bifurcation with this new notion of bifurcation many longstanding bifurcation

problems in science and engineering are becoming accessible and are treated in the second part of the book in particular applications are covered for a variety of pdes from science and engineering including the kuramotoocosivashinsky equation the cahnocohillard equation the ginzburgocolandau equation reaction diffusion equations in biology and chemistry the benard convection problem and the taylor problem the applications provide on the one hand general recipes for other applications of the theory addressed in this book and on the other full classifications of the bifurcated attractor and the global attractor as the control parameters cross certain critical values dictated usually by the eigenvalues of the linearized problems it is expected that the book will greatly advance the study of nonlinear dynamics for many problems in science and engineering

in the past three decades bifurcation theory has matured into a well established and vibrant branch of mathematics this book gives a unified presentation in an abstract setting of the main theorems in bifurcation theory as well as more recent and lesser known results it covers both the local and global theory of one parameter bifurcations for operators acting in infinite dimensional banach spaces and shows how to apply the theory to problems involving partial differential equations in addition to existence qualitative properties such as stability and nodal structure of bifurcating solutions are treated in depth this volume will serve as an important reference for mathematicians physicists and theoretically inclined engineers working in bifurcation theory and its applications to partial differential equations the second edition is substantially and formally revised and new material is added among this is bifurcation with a two dimensional kernel with applications the buckling of the euler rod the appearance of taylor vortices the singular limit process of the cahn hilliard model and an application of this method to more complicated nonconvex variational problems

providing readers with a solid basis in dynamical systems theory as well as explicit

procedures for application of general mathematical results to particular problems the focus here is on efficient numerical implementations of the developed techniques the book is designed for advanced undergraduates or graduates in applied mathematics as well as for ph d students and researchers in physics biology engineering and economics who use dynamical systems as model tools in their studies a moderate mathematical background is assumed and whenever possible only elementary mathematical tools are used this new edition preserves the structure of the first while updating the context to incorporate recent theoretical developments in particular new and improved numerical methods for bifurcation analysis

dynamical bifurcation theory is concerned with the changes that occur in the global structure of dynamical systems as parameters are varied this book makes recent research in bifurcation theory of dynamical systems accessible to researchers interested in this subject in particular the relevant results obtained by chinese mathematicians are introduced as well as some of the works of the authors which may not be widely known the focus is on the analytic approach to the theory and methods of bifurcations the book prepares graduate students for further study in this area and it serves as a ready reference for researchers in nonlinear sciences and applied mathematics

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applied mathematics

bifurcation theory with applications is a collection of chapters that describe the theory and application of nonlinear dynamics to a wide variety of problems in physics and engineering each chapter is self contained and includes an introduction main contributions and details of up to date theoretical computational and experimental results the book examines various practical systems including models of target detection in cells through the analysis of bio nanomachine attractant and repellent concentrations it addresses the quasistatic evolution of anelastic structures explores the generation of triangular patterns through anisotropic diffusion and discusses the stabilization of time delay distributed bilinear systems in spatial domains topics also include optimal control challenges in bilinear systems with unbounded and bounded control sets forward bifurcation in hepatitis b virus infection models and the bifurcation of hematological stem cells with feedback control in a biological context the book is designed for theorists applied mathematicians and engineers across diverse scientific disciplines serving as a valuable resource for anyone interested in bifurcation theory s wide ranging applications

this monograph presents the most recent progress in bifurcation theory of impulsive dynamical systems with time delays and other functional dependence it covers not only smooth local bifurcations but also some non smooth bifurcation phenomena that are unique to impulsive dynamical systems the monograph is split into four distinct parts independently addressing both finite and infinite dimensional dynamical systems before discussing their applications the primary contributions are a rigorous nonautonomous dynamical systems framework and analysis of nonlinear systems stability and invariant manifold theory special attention is paid to the centre manifold and associated reduction principle as these are essential to the local bifurcation theory specifying to periodic systems the floquet theory is extended

to impulsive functional differential equations and this permits an exploration of the impulsive analogues of saddle node transcritical pitchfork and hopf bifurcations readers will learn how techniques of classical bifurcation theory extend to impulsive functional differential equations and as a special case impulsive differential equations without delays they will learn about stability for fixed points periodic orbits and complete bounded trajectories and how the linearization of the dynamical system allows for a suitable definition of hyperbolicity they will see how to complete a centre manifold reduction and analyze a bifurcation at a nonhyperbolic steady state

providing readers with a solid basis in dynamical systems theory as well as explicit procedures for application of general mathematical results to particular problems the focus here is on efficient numerical implementations of the developed techniques the book is designed for advanced undergraduates or graduates in applied mathematics as well as for ph d students and researchers in physics biology engineering and economics who use dynamical systems as model tools in their studies a moderate mathematical background is assumed and whenever possible only elementary mathematical tools are used this new edition preserves the structure of the first while updating the context to incorporate recent theoretical developments in particular new and improved numerical methods for bifurcation analysis

this volume presents the proceedings of a colloquium inspired by the former president of the french mathematical society michel herve the aim was to promote the development of mathematics through applications since the ancient supports the new it seemed appropriate to center the theoretical conferences on new subjects since the world is movement and creation the theoretical conferences were planned on mechanics movement and bifurcation theory creation five aspects of mechanics were to be presented but unfortunately it has not been possible to

include the statistical mechanics aspect so that only four aspects are presented classical mechanics hamiltonian lagrangian poisson w n tulczyjew j e l hite c m marie quantum mechanics in particular the passage from the classical to the quantum approach and the problem of finding the explicit solution of schrodinger s equation m cahen and s gutt j leray fluid mechanics meaning problems involving partial differential equations one of the speakers we hoped would attend the conference was in japan at the time however his lecture is presented in these proceedings j f pommaret h i l shi mathematical information theory s guiasll traditional physical arguments are characterized by their great homogeneity and mathematically expressed by the compactness property in such cases there is a kind of duality between locality and globality which allows the use of the infinitesimal in global considerations

in the past three decades bifurcation theory has matured into a well established and vibrant branch of mathematics this book gives a unified presentation in an abstract setting of the main theorems in bifurcation theory as well as more recent and lesser known results it covers both the local and global theory of one parameter bifurcations for operators acting in infinite dimensional banach spaces and shows how to apply the theory to problems involving partial differential equations in addition to existence qualitative properties such as stability and nodal structure of bifurcating solutions are treated in depth this volume will serve as an important reference for mathematicians physicists and theoretically inclined engineers working in bifurcation theory and its applications to partial differential equations

bifurcation theory studies how the structure of solutions to equations changes as parameters are varied the nature of these changes depends both on the number of parameters and on the symmetries of the equations volume i discusses how singularity theoretic techniques aid the understanding of transitions in multiparameter systems this volume focuses on bifurcation problems with

symmetry and shows how group theoretic techniques aid the understanding of transitions in symmetric systems four broad topics are covered group theory and steady state bifurcation equivariant singularity theory hopf bifurcation with symmetry and mode interactions the opening chapter provides an introduction to these subjects and motivates the study of systems with symmetry detailed case studies illustrate how group theoretic methods can be used to analyze specific problems arising in applications

every student in engineering or in other fields of the applied sciences who has passed through his curriculum knows that the treatment of nonlinear problems has been either avoided completely or is confined to special courses where a great number of different ad hoc methods are presented the wide spread belief that no straightforward solution procedures for nonlinear problems are available prevails even today in engineering circles though in some courses it is indicated that in principle nonlinear problems are solvable by numerical methods the treatment of nonlinear problems more or less is considered to be an art or an intellectual game a good example for this statement was the search for lyapunov functions for nonlinear stability problems in the seventies however things have changed at the beginning of the seventies starting with the work of v i arnold r thom and many others new ideas which however have their origin in the work of h poincare and a a andronov in the treatment of nonlinear problems appeared these ideas gave birth to the term bifurcation theory bifurcation theory allows to solve a great class of nonlinear problems under variation of parameters in a straightforward manner

this book has been written in a frankly partisan spirit we believe that singularity theory offers an extremely useful approach to bifurcation problems and we hope to convert the reader to this view in this preface we will discuss what we feel are the strengths of the singularity theory approach this discussion then leads naturally into a discussion of the contents of the book and the prerequisites for reading it let us

emphasize that our principal contribution in this area has been to apply pre existing techniques from singularity theory especially unfolding theory and classification theory to bifurcation problems many of the ideas in this part of singularity theory were originally proposed by rene thom the subject was then developed rigorously by john mather and extended by v i arnold in applying this material to bifurcation problems we were greatly encouraged by how well the mathematical ideas of singularity theory meshed with the questions addressed by bifurcation theory concerning our title singularities and groups in bifurcation theory it should be mentioned that the present text is the first volume in a two volume sequence in this volume our emphasis is on singularity theory with group theory playing a subordinate role in volume ii the emphasis will be more balanced having made these remarks let us set the context for the discussion of the strengths of the singularity theory approach to bifurcation as we use the term bifurcation theory is the study of equations with multiple solutions

providing readers with a solid basis in dynamical systems theory as well as explicit procedures for application of general mathematical results to particular problems the focus here is on efficient numerical implementations of the developed techniques the book is designed for advanced undergraduates or graduates in applied mathematics as well as for ph d students and researchers in physics biology engineering and economics who use dynamical systems as model tools in their studies a moderate mathematical background is assumed and whenever possible only elementary mathematical tools are used this new edition preserves the structure of the first while updating the context to incorporate recent theoretical developments in particular new and improved numerical methods for bifurcation analysis

ischemia and loss of vascular autoregulation in ocular and cerebral diseases a new perspective presents evidence that ischemia and loss of autoregulation of blood

flow are associated with the onset of the major ocular and cerebral diseases including macular degeneration diabetic retinopathy low and normal tension open angle glaucoma stroke and alzheimer s disease recognition of these vascular changes underline the critical need for clinicians to monitor blood flow and autoregulation to improve early diagnosis and to optimize therapies of ocular and cerebral vascular diseases the text brings to clinicians in ophthalmology neurology medicine optometry and geriatrics decisive guidance on the practical aspects for early diagnosis and treatment of ocular and cerebral diseases the author brings together in a concise form the progress made over the span of his career and provides new perspectives and understanding of the fluid circulations of the eye and the brain in addition he explains the new analytical technologies that made the new concepts possible the physiological and functional importance of blood flow autoregulation in the eye and in the brain in minimizing the progression of pathology including the ischemia resulting from stenosis of the internal carotid artery and stroke are also presented about the author dr langham was born in london england in 1947 he joined the ophthalmological research unit newly formed by the medical research council of the united kingdom under the direction of sir stewart duke elder in 1956 the author enjoyed a research fellowship at harvard university after returning to england for a time he accepted a position of associate professor of ophthalmology and director of research at the wilmer ophthalmological institute of the johns hopkins hospital and medical school in 1959 there he initiated a program in which all residents spent time engaged in research this productive interaction between the disciplines led to many important clinical diagnostic and therapeutic advances

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