

<<动力系统VIII:奇异理论II—应用>>

图书基本信息

书名：<<动力系统VIII:奇异理论II—应用>>

13位ISBN编号：9787030234957

10位ISBN编号：7030234952

出版时间：2009-1

出版时间：科学出版社

作者：阿诺德

页数：235

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

<<动力系统VIII:奇异理论II—应>>

前言

要使我国的数学事业更好地发展起来,需要数学家淡泊名利并付出更艰苦地努力。

另一方面,我们也要从客观上为数学家创造更有利的发展数学事业的外部环境,这主要是加强对数学事业的支持与投资力度,使数学家有较好的工作与生活条件,其中也包括改善与加强数学的出版工作。

从出版方面来讲,除了较好较快地出版我们自己的成果外,引进国外的先进出版物无疑也是十分重要与必不可少的。

从数学来说,施普林格(Springer)出版社至今仍然是世界上最具权威的出版社。

科学出版社影印一批他们出版的好的新书,使我国广大数学家能以较低的价格购买,特别是在边远地区工作的数学家能普遍见到这些书,无疑是对推动我国数学的科研与教学十分有益的事。

这次科学出版社购买了版权,一次影印了23本施普林格出版社出版的数学书,就是一件好事,也是值得继续做下去的事情。

大体上分一下,这23本书中,包括基础数学书5本,应用数学书6本与计算数学书12本,其中有些书也具有交叉性质。

这些书都是很新的,2000年以后出版的占绝大部分,共计16本,其余的也是1990年以后出版的。

这些书可以使读者较快地了解数学某方面的前沿,例如基础数学中的数论、代数与拓扑三本,都是由该领域大数学家编著的“数学百科全书”的分册。

对从事这方面研究的数学家了解该领域的前沿与全貌很有帮助。

按照学科的特点,基础数学类的书以“经典”为主,应用和计算数学类的书以“前沿”为主。

这些书的作者多数是国际知名的大数学家,例如《拓扑学》一书的作者诺维科夫是俄罗斯科学院的院士,曾获“菲尔兹奖”和“沃尔夫数学奖”。

这些大数学家的著作无疑将会对我国的科研人员起到非常好的指导作用。

当然,23本书只能涵盖数学的一部分,所以,这项工作还应该继续做下去。

更进一步,有些读者面较广的好书还应该翻译成中文出版,使之有更大的读者群。

总之,我对科学出版社影印施普林格出版社的部分数学著作这一举措表示热烈的支持,并盼望这一工作取得更大的成绩。

内容概要

This volume of the Encyclopaedia is devoted to applications of singularity theory in mathematics and physics. The authors Arnol'd, Vasil'ev, Goryunov and Lyashko study bifurcation sets arising in various contexts such as the stability of singular points of dynamical systems, boundaries of the domains of ellipticity and hyperbolicity of partial differential equations, boundaries of spaces of oscillating linear equations with variable coefficients and boundaries of fundamental systems of solutions. The book also treats applications of the following topics: functions on manifolds with boundary, projections of complete intersections, caustics, wave fronts, evolvents, maximum functions, shock waves, Petrovskij lacunas and generalizations of Newton's topological proof that Abelian integrals are transcendental. The book contains a list of open problems, conjectures and directions for future research. It will be of great interest for mathematicians and physicists as a reference and research aid.

<<动力系统VIII:奇异理论II—应>>

作者简介

作者：(俄罗斯)阿诺德 (Arnol'd.V.L)

书籍目录

Foreword

Chapter 1. Classification of Functions and Mappings

1. Functions on a Manifold with Boundary

1.1. Classification of Functions on a Manifold with a Smooth Boundary

1.2. Versal Deformations and Bifurcation Diagrams

1.3. Relative Homology Basis

1.4. Intersection Form

1.5. Duality of Boundary Singularities

1.6. Functions on a Manifold with a Singular Boundary

2. Complete Intersections

2.1. Start of the Classification

2.2. Critical and Discriminant Sets

2.3. The Nonsingular Fiber

2.4. Relations Between the Tyurina and Milnor Numbers

2.5. Adding a Power of a New Variable

2.6. Relative Monodromy

2.7. Dynkin Diagrams

2.8. Parabolic and Hyperbolic Singularities

2.9. Vector Fields on a Quasihomogeneous Complete Intersection

2.10. The Space of a Miniversal Deformation of a Quasihomogeneous Singularity

2.11. Topological Triviality of Versal Deformations

3. Projections and Left-Right Equivalence

3.1. Projections of Space Curves onto the Plane

3.2. Singularities of Projections of Surfaces onto the Plane

3.3. Projections of Complete Intersections

3.4. Projections onto the Line

3.5. Mappings of the Line into the Plane

3.6. Mappings of the Plane into Three-Space

4. Nonisolated Singularities of Functions

4.1. Transversal Type of a Singularity

4.2. Realization

4.3. Topology of the Nonsingular Fiber

4.4. Series of Isolated Singularities

4.5. The Number of Indices of a Series

4.6. Functions with a One-Dimensional Complete Intersection as Critical Set and with Transversal Type A1

5. Vector Fields Tangent to Bifurcation Varieties

5.1. Functions on Smooth Manifolds

5.2. Projections onto the Line

5.3. Isolated Singularities of Complete Intersections

5.4. The Equation of a Free Divisor

6. Divergent and Cyclic Diagrams of Mappings

6.1. Germs of Smooth Functions

6.2. Envelopes

6.3. Holomorphic Diagrams

Chapter 2. Applications of the Classification of Critical Points of Functions

1. Legendre Singularities

1.1. Equidistants

1.2. Projective Duality

1.3. Legendre Transformation

1.4. Singularities of Pedals and Primitives

1.5. The Higher-Dimensional Case

2. Lagrangian Singularities

2.1. Caustics

2.2. The Manifold of Centers

2.3. Caustics of Systems of Rays

2.4. The Gauss Map

2.5. Caustics of Potential Systems of Noninteracting Particles

2.6. Coexistence of Singularities

3. Singularities of Maxwell Sets

3.1. Maxwell Sets

3.2. Metamorphoses of Maxwell Sets

3.3. Extended Maxwell Sets

3.4. Complete Maxwell Set Close to the Singularity A5

3.5. The Structure of Maxwell Sets Close to the Metamorphosis A5

3.6. Enumeration of the Connected Components of Spaces of Nondegenerate Polynomials

4. Bifurcations of Singular Points of Gradient Dynamical Systems

4.1. Thorn's Conjecture

4.2. Singularities of Corank One

4.3. Guckenheimer's Counterexample

4.4. Three-Parameter Families of Gradients

4.5. Normal Forms of Gradient Systems D4

4.6. Bifurcation Diagrams and Phase Portraits of Standard Families.

4.7. Multiparameter Families

Chapter 3. Singularities of the Boundaries of Domains of Function Spaces

1. Boundary of Stability

1.1. Domains of Stability

1.2. Singularities of the Boundary of Stability in Low-Dimensional Spaces

1.3. Stabilization Theorem

1.4. Finiteness Theorem

2. Boundary of Ellipticity

2.1. Domains of Ellipticity

2.2. Stabilization Theorems

2.3. Boundaries of Ellipticity and Minimum Functions

2.4. Singularities of the Boundary of Ellipticity in Low-Dimensional Spaces

3. Boundary of Hyperbolicity

3.1. Domain of Hyperbolicity

3.2. Stabilization Theorems

3.3. Local Hyperbolicity

3.4. Local Properties of Domains of Hyperbolicity

4. Boundary of the Domain of Fundamental Systems

4.1. Domain of Fundamental Systems and the Bifurcation Set

4.2. Singularities of Bifurcation Sets of Generic Three-Parameter Families

4.3. Bifurcation Sets and Schubert Cells

4.4. Normal Forms

4.5. Duality

4.6. Bifurcation Sets and Tangential Singularities

4.7. The Group of Transformations of Sets and Finite Determinacy

4.8. Bifurcation Diagrams of Flattenings of Projective Curves

5. Linear Differential Equations and Complete Flag Manifolds

Chapter 4. Applications of Ramified Integrals and Generalized Picard-Lefschetz Theories

1. Newton's Theorem on Nonintegrability

1.1. Newton's Theorem and Archimedes's Example

1.2. Multi-dimensional Newton Theorem (Even Case)

1.3. Obstructions to Integrability in the Odd-Dimensional Case

1.4. Newton's Theorem for Nonconvex Domains

1.5. The Case of Nonsmooth Domains

1.6. Homological Formulation and the General Statement of the Problem

1.7. Localization and Lowering the Dimension in the Calculation of Monodromy

1.8. General Construction of the Variation Operators

1.9. The "Cap" Element

1.10. Ramification of Cycles Close to Nonsingular Points

1.11. Ramification Close to Individual Singularities

1.12.

Stabilization of Monodromy Close to Strata of Positive Dimension 1.13. Ramification Around the Asymptotic Directions and Monodromy of Boundary Singularities 1.14. Pham's Formulas 1.15. Problems, Conjectures, Complements

2. Ramification of Solutions of Hyperbolic Equations 2.1. Hyperbolic Operators and Hyperbolic Polynomials 2.2. Wave Front of a Hyperbolic Operator 2.3. Singularities of Wave Fronts and Generating Functions 2.4. Lacunas, Sharpness, Diffusion 2.5. Sharpness and Diffusion Close to the Simplest Singularities of Wave Fronts 2.6. The Herglotz-Petrovskii-Leray Integral Formula 2.7. The Petrovskii Criterion 2.8. Local Petrovskii Criterion 2.9. Local Petrovskii Cycle 2.10. C^{-1} -Inversion of the Petrovskii Criterion, Stable Singularities of Fronts and Sneaky Diffusion 2.11. Normal Forms of Nonsharpness Close to Singularities of Wave Fronts 2.12. Construction of Leray and Petrovskii Cycles for Strictly Hyperbolic Polynomials 2.13. Problems

3. Integrals of Ramified Forms and Monodromy of Homology with Nontrivial Coefficients 3.1. The Hypergeometric Function of Gauss 3.2. Homology of Local Systems 3.3. Meromorphy of the Integral of the Function P 3.4. The Integral of the Function p as a Function of P 3.5. Monodromy and Linear Independence of Hypergeometric Functions 3.6. Twisted Picard-Lefschetz Theory of Isolated Singularities of Smooth Functions and Representations of Hecke Algebras

Chapter 5. Deformations of Real Singularities and Local Petrovskii Lacunas

1. Local Petrovskii Cycles and their Properties 1.1. Definition of Local Petrovskii Cycles 1.2. Complex Conjugation 1.3. Boundary of the Petrovskii Class 1.4. Computation of Petrovskii Cocycles in Terms of Vanishing Cycles 1.5. Stabilization

2. Local Lacunas for Concrete Singularities 2.1. Local Lacunas for Singularities that are Stably Equivalent to Extrema 2.2. The Number of Local Lacunas for the Tabulated Singularity

3. Complements of Discriminants of Real Singularities 3.1. Components of the Complement of the Discriminant of Simple Singularities 3.2. A Regular Search Algorithm for Morse Decompositions of Singularities 3.3. Remarks on the Realization of the Algorithm 3.4. Problems and Perspectives

Bibliography
Author Index
Subject Index

章节摘录

插图：

<<动力系统VIII:奇异理论II—应>>

编辑推荐

《国外数学名著系列(续1)(影印版)52:动力系统8(奇异理论2)(应用)》由科学出版社出版。

版权说明

本站所提供下载的PDF图书仅提供预览和简介, 请支持正版图书。

更多资源请访问:<http://www.tushu007.com>