

Curves And Singularities A Geometrical Introduction To Singularity Theory

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MARSH LESTER

The Home Encyclopædia Springer Science & Business Media

This volume brings together recent, original research and survey articles by leading experts in several fields that include singularity theory, algebraic geometry and commutative algebra. The motivation for this collection comes from the wide-ranging research of the distinguished mathematician, Antonio Campillo, in these and related fields. Besides his influence in the mathematical community stemming from his research, Campillo has also endeavored to promote mathematics and mathematicians' networking everywhere, especially in Spain, Latin America and Europe. Because of his impressive achievements throughout his career, we dedicate this book to Campillo in honor of his 65th birthday. Researchers and students from the world-wide, and in particular Latin American and European, communities in singularities, algebraic geometry, commutative algebra, coding theory, and other fields covered in the volume, will have interest in this book.

Proceedings of the 4th Japanese-Australian Workshop (JARCS4) Springer

Since the beginning of human history we have had a communication network that is identical with the physical distribution network. In the late 19th century we established the energy network to distribute electric and thermal energy, launching the modern society. The analog communication network became popular in the middle of the 20th century. And now, at the end of the 20th century, we have global digital information

networks. Along with the advancement of the communication network, the progress of the information processing technology can be classified into three historical phases. The first phase technology is physical information processing, treating physical data from the real world. This technology is often called "signal processing" and is based on the physical law of nature. The second phase is free from the physical constraints. It is logical information processing, dealing with knowledge and rules. The most important aspect of this phase is consistency. "Provable" is employed to confirm the reality of the system. Based on the advanced computer and network technology, we are entering the third phase of information processing, which is "Kansei" information processing. ("Kansei" is a Japanese word expressing some subjective ability referred to as "sensitivity", "intuition", "affection" or "emotion"). Emotional resonance or consent is important in the pursuit of reality in this phase. Multimedia modeling to harmonize different media and systems is one of the key technologies in the third phase of information processing. It will provide a next generation framework to construct a human-centered information environment that is more comfortable and more productive. This volume is devoted to a discussion on effective modeling of multimedia information and systems for a wide range of applications. It contains 30 technical articles, all of which were selected, after vigorous peer reviews, for presentation at the International Conference on Multimedia Modeling held in Nagano, Japan, on 13-15 November 2000. *Curves and Singularities* Cambridge University Press

This book presents a broad overview of the important recent progress which led to the emergence of new ideas in Lipschitz geometry and singularities, and started to build bridges to several major areas of singularity theory. Providing all the necessary background in a series of introductory lectures, it also contains Pham and Teissier's previously unpublished pioneering work on the Lipschitz classification of germs of plane

complex algebraic curves. While a real or complex algebraic variety is topologically locally conical, it is in general not metrically conical; there are parts of its link with non-trivial topology which shrink faster than linearly when approaching the special point. The essence of the Lipschitz geometry of singularities is captured by the problem of building classifications of the germs up to local bi-Lipschitz homeomorphism. The Lipschitz geometry of a singular space germ is then its equivalence class in this category. The book is aimed at graduate students and researchers from other fields of geometry who are interested in studying the multiple open questions offered by this new subject.

Geometric Configurations of Singularities of Planar Polynomial Differential Systems World Scientific

Algebraic geometry has benefited enormously from the powerful general machinery developed in the latter half of the twentieth century. The cost has been that much of the research of previous generations is in a language unintelligible to modern workers, in particular, the rich legacy of classical algebraic geometry, such as plane algebraic curves of low degree, special algebraic surfaces, theta functions, Cremona transformations, the theory of apolarity and the geometry of lines in projective spaces. The author's contemporary approach makes this legacy accessible to modern algebraic geometers and to others who are interested in applying classical results. The vast bibliography of over 600 references is complemented by an array of exercises that extend or exemplify results given in the book.

Festschrift for Antonio Campillo on the Occasion of his 65th Birthday World Scientific

This book presents the proceedings of two conferences, Resolution des singularites et geometrie non commutative and the Annapolis Algebraic Geometry Conference. Research articles in the volume cover various topics of algebraic geometry, including the theory of Jacobians, singularities, applications to cryptography, and more. The book is suitable for graduate students and research mathematicians interested in algebraic geometry.

The Encyclopaedia Britannica CRC Press

This second edition is an invaluable textbook for anyone who would like an introduction to the modern theories of catastrophies and singularities.

A Second Course in Algebraic Geometry Springer Nature

This book describes recent progress in the topological study of plane curves. The theory of plane curves is much richer than knot theory, which may be considered the commutative version of the theory of plane curves. This study is based on singularity theory: the infinite-dimensional space of curves is subdivided by the discriminant hypersurfaces into parts consisting of generic curves of the same type. The invariants distinguishing the types are defined by their jumps at the crossings of these hypersurfaces. Arnold describes applications to the geometry of caustics and of wavefronts in symplectic and contact geometry. These applications extend the classical four-vertex theorem of elementary plane geometry to estimates on the minimal number of cusps necessary for the reversion of a wavefront and to generalizations of the last geometrical theorem of Jacobi on conjugated points on convex surfaces. These estimates open a new chapter in symplectic and contact topology: the theory of Lagrangian and Legendrian collapses, providing an unusual and far-reaching higher-dimensional extension of Sturm theory of the oscillations of linear combinations of eigenfunctions.

A Global Classification in the Quadratic Case World Scientific

"Presents the structure of algebras appearing in representation theory of groups and algebras with general ring theoretic methods related to representation theory. Covers affine algebraic sets and the nullstellensatz, polynomial and rational functions, projective algebraic sets. Groebner basis, dimension of algebraic sets, local theory, curves and elliptic curves, and more."

Curves and Surfaces Cambridge University Press

This book can form the basis of a second course in algebraic geometry. As motivation, it takes concrete questions from enumerative geometry and intersection theory, and provides intuition and technique, so that the student develops the ability to solve geometric problems. The authors explain key ideas, including rational equivalence, Chow rings, Schubert calculus and Chern classes, and readers will appreciate the abundant examples, many provided as exercises with solutions available online. Intersection is concerned with the enumeration of solutions of systems of polynomial equations in several variables. It has been an active area of mathematics since the work of Leibniz. Chasles' nineteenth-century calculation that there are 3264 smooth conic plane curves tangent to five given general conics was an important landmark, and was the inspiration behind the title of this book. Such computations were motivation for Poincaré's development of topology, and for many subsequent theories, so that intersection theory is now a central topic of modern mathematics.

Proceedings of the Trieste Singularity Summer School and Workshop, ICTP, Trieste, Italy, 15 August - 3 September 2005 Springer Nature

This book provides an accessible and self-contained introduction to the theory of algebraic curves over a finite field, a subject that has been of fundamental importance to mathematics for many years and that has essential applications in areas such as finite geometry, number theory, error-correcting codes, and cryptography. Unlike other books, this one emphasizes the algebraic geometry rather than the function field approach to algebraic curves. The authors begin by developing the general theory of curves over any field, highlighting peculiarities occurring for positive characteristic and requiring of the reader only basic knowledge of algebra and geometry. The special properties that a curve over a finite field can have are then discussed. The geometrical theory of linear series is used to find estimates for the number of rational points on a curve, following the theory of Stöhr and Voloch. The approach of Hasse and Weil via zeta functions is explained, and then attention turns to more advanced results: a state-of-the-art introduction to maximal curves over finite fields is provided; a comprehensive account is given of the automorphism group of a curve; and some applications to coding theory and finite geometry are described. The book includes many examples and exercises. It is an indispensable resource for researchers and the ideal textbook for graduate students.

The Seduction of Curves American Mathematical Soc.

A collection of articles giving overviews and open questions in singularities and their computational aspects.

Singularities: Geometric and topological aspects Cambridge University Press

This book addresses the global study of finite and infinite singularities of planar polynomial differential systems, with special emphasis on quadratic systems. While results covering the degenerate cases of singularities of quadratic systems have been published elsewhere, the proofs for the

remaining harder cases were lengthier. This book covers all cases, with half of the content focusing on the last non-degenerate ones. The book contains the complete bifurcation diagram, in the 12-parameter space, of global geometrical configurations of singularities of quadratic systems. The authors' results provide - for the first time - global information on all singularities of quadratic systems in invariant form and their bifurcations. In addition, a link to a very helpful software package is included. With the help of this software, the study of the algebraic bifurcations becomes much more efficient and less time-consuming. Given its scope, the book will appeal to specialists on polynomial differential systems, pure and applied mathematicians who need to study bifurcation diagrams of families of such systems, Ph.D. students, and postdoctoral fellows.

Pythagorean-Hodograph Curves: Algebra and Geometry Inseparable American Mathematical Soc.

This development of the theory of complex algebraic curves was one of the peaks of nineteenth century mathematics. They have many fascinating properties and arise in various areas of mathematics, from number theory to theoretical physics, and are the subject of much research. By using only the basic techniques acquired in most undergraduate courses in mathematics, Dr. Kirwan introduces the theory, observes the algebraic and topological properties of complex algebraic curves, and shows how they are related to complex analysis.

Proceedings in Memory of Ruth Michler, July 20-22, 2001, Luminy, France [and] October 25-28, 2001, Annapolis, Maryland CRC Press

Geometric Modeling and Algebraic Geometry, though closely related, are traditionally represented by two almost disjoint scientific communities. Both fields deal with objects defined by algebraic equations, but the objects are studied in different ways. In 12 chapters written by leading experts, this book presents recent results which rely on the interaction of both fields. Some of these results have been obtained from a major European project in geometric modeling.

Singularities of Plane Curves Springer Science & Business Media

Geometry, this very ancient field of study of mathematics, frequently remains too little familiar to students. Michle Audin, professor at the University of Strasbourg, has written a book allowing them to remedy this situation and, starting from linear algebra, extend their knowledge of affine, Euclidean and projective geometry, conic sections and quadrics, curves and surfaces. It includes many nice theorems like the nine-point circle, Feuerbach's theorem, and so on. Everything is presented clearly and rigorously. Each property is proved, examples and exercises illustrate the course content perfectly. Precise hints for most of the exercises are provided at the end of the book. This very comprehensive text is addressed to students at upper undergraduate and Master's level to discover geometry and deepen their knowledge and understanding.

Complex Algebraic Curves Princeton University Press

This volume contains the proceedings of an AMS special session held at the 1999 Joint Mathematics Meetings in San Antonio. The participants were an international group of researchers studying singularities from algebraic and analytic viewpoints. The contributed papers contain original results as well as some expository and historical material. This volume is dedicated to Oscar Zariski, on the one hundredth anniversary of his birth. The topics include the role of valuation theory in algebraic geometry with recent applications to the structure of morphisms; algorithmic approaches to resolution of equisingular surface singularities and locally toric varieties; weak subintegral closures of ideals and Rees valuations; constructions of universal weakly subintegral extensions of rings; direct-sum decompositions of finitely generated modules; construction and examples of resolution graphs of surface singularities; Jacobians of meromorphic curves; investigation of spectral numbers of curve singularities using Puiseux pairs; Grobner basis calculations of Hochschild homology for hypersurfaces with isolated singularities; and the theory of characteristic classes of singular spaces - a brief history with conjectures and open problems.

A Dictionary of Arts, Sciences, and General Literature Curves and SingularitiesA Geometrical Introduction to Singularity Theory

This volume contains invited expository and research papers from the conference Topology of Algebraic Varieties, in honor of Anatoly Libgober's 60th birthday, held June 22-26, 2009, in Jaca, Spain. The volume contains four parts corresponding to the four main focal points of the conference: algebraic geometry and fundamental groups, braids and knots, hyperplane arrangements, and singularities. Together, the papers provide an overview of the current status of a broad range of topological questions in Algebraic Geometry.

8th International Conference, Paris, France, June 12-18, 2014, Revised Selected Papers Cambridge University Press

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The Graduate Bulletin of the University of Nebraska ... Springer

Grothendieck's beautiful theory of schemes permeates modern algebraic geometry and underlies its applications to number theory, physics, and applied mathematics. This simple account of that theory emphasizes and explains the universal geometric concepts behind the definitions. In the book, concepts are illustrated with fundamental examples, and explicit calculations show how the constructions of scheme theory are carried out in practice.

Cambridge University Press

This ENCYCLOPAEDIA OF MATHEMATICS aims to be a reference work for all parts of mathematics. It is a translation with updates and editorial comments of the Soviet Mathematical Encyclopaedia published by 'Soviet Encyclopaedia Publishing House' in five volumes in 1977 - 1985. The annotated translation consists of ten volumes including a special index volume. There are three kinds of articles in this ENCYCLOPAEDIA. First of all there are survey-type articles dealing with the various main directions in mathematics (where a rather fine subdivision has been used). The main requirement for these articles has been that they should give a reasonably complete up-to-date account of the current state of affairs in these areas and that they should be maximally accessible. On the whole, these articles should be understandable to mathematics students in their first specialization years, to graduates from other mathematical areas and, depending on the specific subject, to specialists in other domains of science, engineers and teachers of mathematics. These articles treat their material at a fairly general level and aim to give an idea of the kind of problems, techniques and concepts involved in the area in question. They also contain background and motivation rather than precise statements of precise theorems with detailed definitions and technical details on how to carry out proofs and constructions. The second kind of article, of medium length, contains more detailed concrete problems, results and techniques.

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