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Topics in Cohomological Studies of Algebraic
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Singular Loci of Schubert Varieties A
Panorama of Singularities Frobenius Theorem
for Foliations on Singular Varieties
Foliation Theory in Algebraic Geometry
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Resolution of Singular Algebraic Varieties
Abelian Differentials on Singular Varieties
and Variations on a Theorem of Lie -
Griffiths Differential Geometry of Varieties
with Degenerate Gauss Maps D-modules and
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Categories and K-groups of Singular
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Theory on Singular Complex Algebraic
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to Coding Theory, Physics and Computation
Intersection Theory Contributions to
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Homology

P-adic Cohomology of Some Singular Varieties
Nov 30 2020

**Applications of Algebraic Geometry to
Coding Theory, Physics and Computation** Jun
06 2021 An up-to-date report on the current

status of important research topics in algebraic geometry and its applications, such as computational algebra and geometry, singularity theory algorithms, numerical solutions of polynomial systems, coding theory, communication networks, and computer vision. Contributions on more fundamental aspects of algebraic geometry include expositions related to counting points on varieties over finite fields, Mori theory, linear systems, Abelian varieties, vector bundles on singular curves, degenerations of surfaces, and mirror symmetry of Calabi-Yau manifolds.

Singular Intersection Homology Oct 18 2019
Intersection homology is a version of homology theory that extends Poincaré duality and its applications to stratified spaces, such as singular varieties. This is the first comprehensive expository book-length introduction to intersection homology from the viewpoint of singular and piecewise-linear chains. Recent breakthroughs have made this approach viable by providing intersection homology and cohomology versions of all the standard tools in the homology tool box, making the subject readily accessible to graduate students and researchers in topology as well as

researchers from other fields. This text includes both new research material and new proofs of previously-known results in intersection homology, as well as treatments of many classical topics in algebraic and manifold topology. Written in a detailed but expository style, this book is suitable as an introduction to intersection homology or as a thorough reference.

Homology Theory on Algebraic Varieties Dec 12 2021 Concise and authoritative monograph, geared toward advanced undergraduate and graduate students, covers linear sections, singular and hyperplane sections, Lefschetz's first and second theorems, the Poincaré formula, and invariant and relative cycles. 1958 edition.

Vector Fields on Singular Varieties Feb 26 2023 Vector fields on manifolds play a major role in mathematics and other sciences. In particular, the Poincaré-Hopf index theorem gives rise to the theory of Chern classes, key manifold-invariants in geometry and topology. It is natural to ask what is the 'good' notion of the index of a vector field, and of Chern classes, if the underlying space becomes singular. The question has been explored by several authors resulting in various answers,

starting with the pioneering work of M.-H. Schwartz and R. MacPherson. We present these notions in the framework of the obstruction theory and the Chern-Weil theory. The interplay between these two methods is one of the main features of the monograph.

Differential Geometry of Varieties with Degenerate Gauss Maps Feb 14 2022 This book surveys the differential geometry of varieties with degenerate Gauss maps, using moving frames and exterior differential forms as well as tensor methods. The authors illustrate the structure of varieties with degenerate Gauss maps, determine the singular points and singular varieties, find focal images and construct a classification of the varieties with degenerate Gauss maps.

Singular Loci of Schubert Varieties Jan 01 2021

Ample Subvarieties of Algebraic Varieties Jul 27 2020

Flag Varieties Feb 20 2020 This book discusses the importance of flag varieties in geometric objects and elucidates its richness as interplay of geometry, combinatorics and representation theory. The book presents a discussion on the representation theory of complex semisimple Lie algebras, as well as the representation

theory of semisimple algebraic groups. In addition, the book also discusses the representation theory of symmetric groups. In the area of algebraic geometry, the book gives a detailed account of the Grassmannian varieties, flag varieties, and their Schubert subvarieties. Many of the geometric results admit elegant combinatorial description because of the root system connections, a typical example being the description of the singular locus of a Schubert variety. This discussion is carried out as a consequence of standard monomial theory. Consequently, this book includes standard monomial theory and some important applications—singular loci of Schubert varieties, toric degenerations of Schubert varieties, and the relationship between Schubert varieties and classical invariant theory. The two recent results on Schubert varieties in the Grassmannian have also been included in this book. The first result gives a free resolution of certain Schubert singularities. The second result is about certain Levi subgroup actions on Schubert varieties in the Grassmannian and derives some interesting geometric and representation-theoretic consequences.

Singular Algebraic Curves Nov 18 2019

Singular algebraic curves have been in the focus of study in algebraic geometry from the very beginning, and till now remain a subject of an active research related to many modern developments in algebraic geometry, symplectic geometry, and tropical geometry. The monograph suggests a unified approach to the geometry of singular algebraic curves on algebraic surfaces and their families, which applies to arbitrary singularities, allows one to treat all main questions concerning the geometry of equisingular families of curves, and, finally, leads to results which can be viewed as the best possible in a reasonable sense. Various methods of the cohomology vanishing theory as well as the patchworking construction with its modifications will be of a special interest for experts in algebraic geometry and singularity theory. The introductory chapters on zero-dimensional schemes and global deformation theory can well serve as a material for special courses and seminars for graduate and post-graduate students. Geometry in general plays a leading role in modern mathematics, and algebraic geometry is the most advanced area of research in geometry. In turn, algebraic curves for more than one

century have been the central subject of algebraic geometry both in fundamental theoretic questions and in applications to other fields of mathematics and mathematical physics. Particularly, the local and global study of singular algebraic curves involves a variety of methods and deep ideas from geometry, analysis, algebra, combinatorics and suggests a number of hard classical and newly appeared problems which inspire further development in this research area.

Homotopy Theory on Singular Complex Algebraic Varieties Jul 07 2021

Residue Currents on Singular Varieties May 17 2022

Algebraic Varieties Sep 09 2021 Algebraic geometry has always been an eclectic science, with its roots in algebra, function-theory and topology. Apart from early researches, now about a century old, this beautiful branch of mathematics has for many years been investigated chiefly by the Italian school which, by its pioneer work, based on algebro-geometric methods, has succeeded in building up an imposing body of knowledge. Quite apart from its intrinsic interest, this possesses high heuristic value since it represents an essential step towards the modern achievements. A certain

lack of rigour in the classical methods, especially with regard to the foundations, is largely justified by the creative impulse revealed in the first stages of our subject; the same phenomenon can be observed, to a greater or less extent, in the historical development of any other science, mathematical or non-mathematical. In any case, within the classical domain itself, the foundations were later explored and consolidated, principally by SEVERI, on lines which have frequently inspired further investigations in the abstract field. About twenty-five years ago B. L. VAN DER WAERDEN and, later, O. ZARISKI and A. WEIL, together with their schools, established the methods of modern abstract algebraic geometry which, rejecting the classical restriction to the complex groundfield, gave up geometrical intuition and undertook arithmetisation under the growing influence of abstract algebra.

A Panorama of Singularities Aug 20 2022

This volume contains the proceedings of the conference A Panorama on Singular Varieties, celebrating the 70th birthday of Lê Dũng Tráng, held from February 7-10, 2017, at the University of Seville, IMUS, Seville, Spain. The articles cover a wide range of topics in

the study of singularities and should be of great value to graduate students and research faculty who have a basic background in the theory of singularities.

Multiplicity of Functions on Singular Varieties Nov 11 2021

Contributions to Algebraic Geometry Apr 04 2021 The articles in this volume cover a broad range of topics in algebraic geometry: classical varieties, linear system, birational geometry, Minimal Model Program, moduli spaces, toric varieties, enumerative theory of singularities, equivariant cohomology and arithmetic questions.

p-adic Hodge Theory, Singular Varieties, and Non-Abelian Aspects Sep 28 2020 This proceedings volume contains articles related to the research presented at the 2019 Simons Symposium on p-adic Hodge theory. This symposium was focused on recent developments in p-adic Hodge theory, especially those concerning non-abelian aspects This volume contains both original research articles as well as articles that contain both new research as well as survey some of these recent developments.

The Grassmannian Variety Feb 02 2021 This book gives a comprehensive treatment of the Grassmannian varieties and their Schubert

subvarieties, focusing on the geometric and representation-theoretic aspects of Grassmannian varieties. Research of Grassmannian varieties is centered at the crossroads of commutative algebra, algebraic geometry, representation theory, and combinatorics. Therefore, this text uniquely presents an exciting playing field for graduate students and researchers in mathematics, physics, and computer science, to expand their knowledge in the field of algebraic geometry. The standard monomial theory (SMT) for the Grassmannian varieties and their Schubert subvarieties are introduced and the text presents some important applications of SMT including the Cohen-Macaulay property, normality, unique factoriality, Gorenstein property, singular loci of Schubert varieties, toric degenerations of Schubert varieties, and the relationship between Schubert varieties and classical invariant theory. This text would serve well as a reference book for a graduate work on Grassmannian varieties and would be an excellent supplementary text for several courses including those in geometry of spherical varieties, Schubert varieties, advanced topics in geometric and differential topology, representation theory

of compact and reductive groups, Lie theory, toric varieties, geometric representation theory, and singularity theory. The reader should have some familiarity with commutative algebra and algebraic geometry.

Categorical Framework for the Study of Singular Spaces May 25 2020

Frobenius Theorem for Foliations on Singular Varieties Jul 19 2022

Riemann-Roch for singular varieties Apr 23 2020

Recent Progress of Algebraic Geometry in Japan Aug 28 2020 Recent Progress of Algebraic Geometry in Japan

D-modules and Singular Varieties Jan 13 2022

Higher Dimensional Varieties and Rational Points Jun 25 2020 Exploring the connections between arithmetic and geometric properties of algebraic varieties has been the object of much fruitful study for a long time, especially in the case of curves. The aim of the Summer School and Conference on "Higher Dimensional Varieties and Rational Points" held in Budapest, Hungary during September 2001 was to bring together students and experts from the arithmetic and geometric sides of algebraic geometry in order to get a better understanding of the current

problems, interactions and advances in higher dimension. The lecture series and conference lectures assembled in this volume give a comprehensive introduction to students and researchers in algebraic geometry and in related fields to the main ideas of this rapidly developing area.

Topics in Cohomological Studies of Algebraic Varieties Nov 23 2022 The articles in this volume study various cohomological aspects of algebraic varieties: - characteristic classes of singular varieties; - geometry of flag varieties; - cohomological computations for homogeneous spaces; - K-theory of algebraic varieties; - quantum cohomology and Gromov-Witten theory. The main purpose is to give comprehensive introductions to the above topics through a series of "friendly" texts starting from a very elementary level and ending with the discussion of current research. In the articles, the reader will find classical results and methods as well as new ones. Numerous examples will help to understand the mysteries of the cohomological theories presented. The book will be a useful guide to research in the above-mentioned areas. It is addressed to researchers and graduate students in algebraic geometry, algebraic

topology, and singularity theory, as well as to mathematicians interested in homogeneous varieties and symmetric functions. Most of the material exposed in the volume has not appeared in books before. Contributors:
Paolo Aluffi Michel Brion Anders Skovsted
Buch Haibao Duan Ali Ulas Ozgur Kisisel
Piotr Pragacz Jörg Schürmann Marek Szyjewski
Harry Tamvakis

Intersection Theory May 05 2021 From the ancient origins of algebraic geometry in the solution of polynomial equations, through the triumphs of algebraic geometry during the last two centuries, intersection theory has played a central role. Since its role in foundational crises has been no less prominent, the lack of a complete modern treatise on intersection theory has been something of an embarrassment. The aim of this book is to develop the foundations of intersection theory, and to indicate the range of classical and modern applications. Although a comprehensive history of this vast subject is not attempted, we have tried to point out some of the striking early appearances of the ideas of intersection theory. Recent improvements in our understanding not only yield a stronger and more useful theory than previously

available, but also make it possible to develop the subject from the beginning with fewer prerequisites from algebra and algebraic geometry. It is hoped that the basic text can be read by one equipped with a first course in algebraic geometry, with occasional use of the two appendices. Some of the examples, and a few of the later sections, require more specialized knowledge. The text is designed so that one who understands the constructions and grants the main theorems of the first six chapters can read other chapters separately. Frequent parenthetical references to previous sections are included for such readers. The summaries which begin each chapter should facilitate use as a reference.

Greenberg Transforms of Singular Varieties and Maps Oct 30 2020

Foliation Theory in Algebraic Geometry Jun 18 2022 Featuring a blend of original research papers and comprehensive surveys from an international team of leading researchers in the thriving fields of foliation theory, holomorphic foliations, and birational geometry, this book presents the proceedings of the conference "Foliation Theory in Algebraic Geometry," hosted by the

Simons Foundation in New York City in September 2013. Topics covered include: Fano and del Pezzo foliations; the cone theorem and rank one foliations; the structure of symmetric differentials on a smooth complex surface and a local structure theorem for closed symmetric differentials of rank two; an overview of lifting symmetric differentials from varieties with canonical singularities and the applications to the classification of AT bundles on singular varieties; an overview of the powerful theory of the variety of minimal rational tangents introduced by Hwang and Mok; recent examples of varieties which are hyperbolic and yet the Green-Griffiths locus is the whole of X ; and a classification of pseudoeffective codimension one distributions. Foliations play a fundamental role in algebraic geometry, for example in the proof of abundance for threefolds and to a solution of the Green-Griffiths conjecture for surfaces of general type with positive Segre class. The purpose of this volume is to foster communication and enable interactions between experts who work on holomorphic foliations and birational geometry, and to bring together leading researchers to demonstrate the powerful

connection of ideas, methods, and goals shared by these two areas of study./div

Derived Categories and K-groups of Singular Varieties Oct 10 2021

The Arithmetic and Geometry of Algebraic Cycles Mar 03 2021 The subject of algebraic cycles has thrived through its interaction with algebraic K-theory, Hodge theory, arithmetic algebraic geometry, number theory, and topology. These interactions have led to such developments as a description of Chow groups in terms of algebraic K-theory, the arithmetic Abel-Jacobi mapping, progress on the celebrated conjectures of Hodge and Tate, and the conjectures of Bloch and Beilinson. The immense recent progress in algebraic cycles, based on so many interactions with so many other areas of mathematics, has contributed to a considerable degree of inaccessibility, especially for graduate students. Even specialists in one approach to algebraic cycles may not understand other approaches well. This book offers students and specialists alike a broad perspective of algebraic cycles, presented from several viewpoints, including arithmetic, transcendental, topological, motives and K-theory methods. Topics include a discussion

of the arithmetic Abel-Jacobi mapping, higher Abel-Jacobi regulator maps, polylogarithms and L-series, candidate Bloch-Beilinson filtrations, applications of Chern-Simons invariants to algebraic cycles via the study of algebraic vector bundles with algebraic connection, motivic cohomology, Chow groups of singular varieties, and recent progress on the Hodge and Tate conjectures for Abelian varieties.

Rational equivalence on singular varieties

Dec 24 2022

Handbook of Geometry and Topology of Singularities III Mar 23 2020 This is the third volume of the Handbook of Geometry and Topology of Singularities, a series which aims to provide an accessible account of the state of the art of the subject, its frontiers, and its interactions with other areas of research. This volume consists of ten chapters which provide an in-depth and reader-friendly survey of various important aspects of singularity theory. Some of these complement topics previously explored in volumes I and II, such as, for instance, Zariski's equisingularity, the interplay between isolated complex surface singularities and 3-manifold theory, stratified Morse theory, constructible

sheaves, the topology of the non-critical levels of holomorphic functions, and intersection cohomology. Other chapters bring in new subjects, such as the Thom-Mather theory for maps, characteristic classes for singular varieties, mixed Hodge structures, residues in complex analytic varieties, nearby and vanishing cycles, and more. Singularities are ubiquitous in mathematics and science in general. Singularity theory interacts energetically with the rest of mathematics, acting as a crucible where different types of mathematical problems interact, surprising connections are born and simple questions lead to ideas which resonate in other parts of the subject, and in other subjects. Authored by world experts, the various contributions deal with both classical material and modern developments, covering a wide range of topics which are linked to each other in fundamental ways. The book is addressed to graduate students and newcomers to the theory, as well as to specialists who can use it as a guidebook.

Introduction to Singularities Oct 22 2022
This book is an introduction to singularities for graduate students and researchers. Algebraic geometry is said to

have originated in the seventeenth century with the famous work *Discours de la méthode pour bien conduire sa raison, et chercher la vérité dans les sciences* by Descartes. In that book he introduced coordinates to the study of geometry. After its publication, research on algebraic varieties developed steadily. Many beautiful results emerged in mathematicians' works. First, mostly non-singular varieties were studied. In the past three decades, however, it has become clear that singularities are necessary for us to have a good description of the framework of varieties. For example, it is impossible to formulate minimal model theory for higher-dimensional cases without singularities. A remarkable fact is that the study of singularities is developing and people are beginning to see that singularities are interesting and can be handled by human beings. This book is a handy introduction to singularities for anyone interested in singularities. The focus is on an isolated singularity in an algebraic variety. After preparation of varieties, sheaves, and homological algebra, some known results about 2-dimensional isolated singularities are introduced. Then a classification of higher-dimensional isolated singularities is

shown according to plurigenera and the behavior of singularities under a deformation is studied. In the second edition, brief descriptions about recent remarkable developments of the researches are added as the last chapter.

Singular Loci of Schubert Varieties Sep 21 2022 "Singular Loci of Schubert Varieties" is a unique work at the crossroads of representation theory, algebraic geometry, and combinatorics. Over the past 20 years, many research articles have been written on the subject in notable journals. In this work, Billey and Lakshmibai have recreated and restructured the various theories and approaches of those articles and present a clearer understanding of this important subdiscipline of Schubert varieties - namely singular loci. The main focus, therefore, is on the computations for the singular loci of Schubert varieties and corresponding tangent spaces. The methods used include standard monomial theory, the nil Hecke ring, and Kazhdan-Lusztig theory. New results are presented with sufficient examples to emphasize key points. A comprehensive bibliography, index, and tables - the latter not to be found elsewhere in the mathematics literature - round out this concise work.

After a good introduction giving background material, the topics are presented in a systematic fashion to engage a wide readership of researchers and graduate students.

Abelian Varieties Jan 21 2020 Based on the work in algebraic geometry by Norwegian mathematician Niels Henrik Abel (1802–29), this monograph was originally published in 1959 and reprinted later in author Serge Lang's career without revision. The treatment remains a basic advanced text in its field, suitable for advanced undergraduates and graduate students in mathematics. Prerequisites include some background in elementary qualitative algebraic geometry and the elementary theory of algebraic groups. The book focuses exclusively on Abelian varieties rather than the broader field of algebraic groups; therefore, the first chapter presents all the general results on algebraic groups relevant to this treatment. Each chapter begins with a brief introduction and concludes with a historical and bibliographical note. Topics include general theorems on Abelian varieties, the theorem of the square, divisor classes on an Abelian variety, functorial formulas, the Picard

variety of an arbitrary variety, the I -adic representations, and algebraic systems of Abelian varieties. The text concludes with a helpful Appendix covering the composition of correspondences.

Rational Points on Varieties Dec 20 2019

This book is motivated by the problem of determining the set of rational points on a variety, but its true goal is to equip readers with a broad range of tools essential for current research in algebraic geometry and number theory. The book is unconventional in that it provides concise accounts of many topics instead of a comprehensive account of just one—this is intentionally designed to bring readers up to speed rapidly. Among the topics included are Brauer groups, faithfully flat descent, algebraic groups, torsors, étale and fppf cohomology, the Weil conjectures, and the Brauer-Manin and descent obstructions. A final chapter applies all these to study the arithmetic of surfaces. The down-to-earth explanations and the over 100 exercises make the book suitable for use as a graduate-level textbook, but even experts will appreciate having a single source covering many aspects of geometry over an unrestricted ground field and containing

some material that cannot be found elsewhere.

Differential Forms on Singular Varieties

Jan 25 2023 Differential Forms on Singular Varieties: De Rham and Hodge Theory

Simplified uses complexes of differential forms to give a complete treatment of the Deligne theory of mixed Hodge structures on the cohomology of singular spaces. This book features an approach that employs recursive arguments on dimension and does not introduce spaces of high

The Resolution of Singular Algebraic Varieties Apr 16 2022 Resolution of Singularities has long been considered as being a difficult to access area of mathematics. The more systematic and simpler proofs that have appeared in the last few years in zero characteristic now give us a much better understanding of singularities. They reveal the aesthetics of both the logical structure of the proof and the various methods used in it. The present volume is intended for readers who are not yet experts but always wondered about the intricacies of resolution. As such, it provides a gentle and quite comprehensive introduction to this amazing field. The book may tempt the reader to enter more deeply

into a topic where many mysteries--especially the positive characteristic case--await to be disclosed. Titles in this series are co-published with the Clay Mathematics Institute (Cambridge, MA).

A Fixed Point Formula for Singular Varieties Aug 08 2021

Abelian Differentials on Singular Varieties and Variations on a Theorem of Lie - Griffiths Mar 15 2022

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