Geometric Invariant Theory Over The Real And Comp

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Algebraic Geometry IV Cambridge University Press
These notes describe a general procedure for calculating the Betti numbers of the projective quotient varieties that geometric invariant theory associates to reductive group actions on nonsingular complex projective varieties. These quotient varieties are interesting in particular because of their relevance to moduli problems in algebraic geometry. The author describes two different approaches to the problem. One is purely algebraic, while the other uses the methods of symplectic geometry and Morse theory, and involves extending classical Morse theory to certain degenerate functions.
Lie Groups Springer
Actions and Invariants of Algebraic Groups, Second Edition presents a self-contained introduction to geometric invariant theory starting from the basic theory of affine algebraic groups and proceeding towards more sophisticated dimensions." Building on the first edition, this book provides an introduction to the theory by equipping the reader with the tools needed to read advanced research in the field. Beginning with commutative algebra, algebraic geometry and the theory of Lie algebras, the book develops the necessary background of affine algebraic groups over an algebraically closed field, and then moves toward the algebraic and geometric aspects of modern invariant theory and quotients.
Geometric Invariant Theory and Moduli Spaces of Pointed Curves Springer Science & Business Media
These twenty-three contributions focus on the most recent developments in the rapidly evolving field of geometric invariants and their application to computer vision. The introduction summarizes the basics of invariant theory, discusses how invariants are related to problems in computer vision, and looks at the future possibilities, particularly the notion that invariant analysis might provide a solution to the elusive problem of recognizing general curved 3D objects from an arbitrary viewpoint. The remaining chapters consist of original papers that present important developments as well as tutorial articles that provide useful background material. These chapters are grouped into categories covering algebraic invariants, nonalgebraic

invariants, invariants of multiple views, and applications. An appendix provides an extensive introduction to projective geometry and its applications to basic problems in computer vision.
Theory of Algebraic Invariants Springer Science & Business Media
This book introduces key topics on Geometric Invariant Theory, a technique to obtaining quotients in algebraic geometry with a good set of properties, through various examples. It starts from the classical Hilbert classification of binary forms, advancing to the construction of the moduli space of semistable holomorphic vector bundles, and to Hitchin's theory on Higgs bundles. The relationship between the notion of stability between algebraic, differential and symplectic geometry settings is also covered. Unstable objects in moduli problems -- a result of the construction of moduli spaces -- get specific attention in this work. The notion of the Harder-Narasimhan filtration as a tool to handle them, and its relationship with GIT quotients, provide instigating new calculations in several problems. Applications include a survey of research results on correspondences between Harder-Narasimhan filtrations with the GIT picture and stratifications of the moduli space of Higgs bundles. Graduate students and researchers who want to approach Geometric Invariant Theory in moduli constructions can greatly benefit from this reading, whose key prerequisites are general courses on algebraic geometry and differential geometry.
Diophantine applications of geometric invariant theory Cambridge University Press
Multiplicative invariant theory, as a research area in its own right within the wider spectrum of invariant theory, is of relatively recent vintage. The present text offers a coherent account of the basic results achieved thus far.. Multiplicative invariant theory is intimately tied to integral representations of finite groups. Therefore, the field has a predominantly discrete, algebraic flavor. Geometry, specifically the theory of algebraic groups, enters through Weyl groups and their root lattices as well as via character lattices of algebraic tori. Throughout the text, numerous explicit examples of multiplicative invariant algebras and fields are presented, including the complete list of all multiplicative invariant algebras for lattices of rank 2. The book is intended for graduate and postgraduate students as well as researchers in integral representation theory, commutative algebra and, mostly, invariant theory.
Real Geometric Invariant Theory and Ricci Soliton Metrics on Two-step Nilmanifolds Springer Nature
The primary goal of this 2003 book is to give a brief introduction to the main ideas of algebraic and geometric invariant theory. It assumes only a minimal background in algebraic geometry, algebra and representation theory. Topics covered include the symbolic method for computation of invariants on the space of homogeneous forms, the problem of finite-generatedness of the algebra of invariants, the theory of covariants and constructions of categorical and geometric quotients. Throughout, the emphasis is on concrete examples which originate in classical algebraic geometry. Based on lectures given at University of Michigan, Harvard University and Seoul National University, the book is written in an accessible style and contains many examples and exercises. A novel feature of the book is a discussion of possible linearizations of actions and the variation of quotients under the change of linearization. Also includes the construction of toric varieties as torus quotients of affine spaces.
Standard Monomial Theory Alpha Science International Limited
Sample Text
Geometric Invariant Theory Cambridge University Press
The invariant theory of non-reductive groups has its roots in the 19th century but has seen some very interesting developments in the past twenty years. This book is an exposition of several related topics including observable subgroups, induced modules, maximal unipotent subgroups of reductive groups and the method of U-invariants, and the complexity of an action. Much of this material has not appeared previously in book form. The exposition assumes a basic knowledge of algebraic groups and then develops each topic systematically with applications to invariant theory. Exercises are included as well as many examples, some of which are related to geometry and physics.
Geometric Invariant Theory Springer
Symmetry is a key ingredient in many mathematical, physical, and biological theories. Using representation theory and invariant theory to analyze the symmetries that arise from group actions, and with strong emphasis on the geometry and basic theory of Lie groups and Lie algebras, Symmetry, Representations, and Invariants is a significant reworking of an earlier highly-acclaimed work by the authors. The result is a comprehensive introduction to Lie theory, representation theory, invariant theory, and algebraic groups, in a new presentation that is more accessible to students and includes a broader range of applications. The philosophy of the earlier book is retained, i.e., presenting the principal theorems of representation theory for the classical matrix groups as motivation for the general theory of reductive groups. The wealth of examples and discussion prepares the reader for the complete arguments now given in the general case. Key Features of Symmetry, Representations, and Invariants: (1) Early chapters suitable for honors undergraduate or beginning graduate courses, requiring only linear algebra, basic abstract algebra, and advanced calculus; (2) Applications to geometry (curvature tensors), topology (Jones polynomial via symmetry), and combinatorics (symmetric group and Young tableaux); (3) Self-contained chapters, appendices, comprehensive bibliography; (4) More than 350 exercises (most with detailed hints for solutions) further explore main concepts; (5) Serves as an excellent main text for a one-year course in Lie group theory; (6) Benefits physicists as well as mathematicians as a reference work.
Actions and Invariants of Algebraic Groups Springer Science & Business Media
Reflection groups and invariant theory is a branch of mathematics that lies at the intersection between geometry and algebra. The book contains a deep and elegant theory, evolved from various graduate courses given by the author over the past 10 years.
Lectures on Invariant Theory Springer Science & Business Media
Geometric invariant theory and moduli spaces of pointed curves.
Introduction to Geometric Invariant Theory Cambridge University Press
Two contributions on closely related subjects: the theory of linear algebraic groups and invariant theory, by well-known experts in the fields. The book will be very useful as a reference and research guide to graduate students and researchers in mathematics and theoretical physics.
Geometric Invariant Theory Springer Science & Business Media
This 2003 book is a brief introduction to algebraic and geometric invariant theory with numerous examples and exercises.
Geometric Invariant Theory, Holomorphic Vector Bundles and the Harder-Narasimhan Filtration Springer
The book starts with an introduction to Geometric Invariant Theory (GIT). The fundamental results of Hilbert and Mumford are exposed as well as more recent topics such as the instability flag, the finiteness of the number of quotients, and the variation of quotients. In the second part, GIT is applied to solve the classification problem of decorated principal bundles on a

compact Riemann surface. The solution is a quasi-projective moduli scheme which parameterizes those objects that satisfy a semistability condition originating from gauge theory. The moduli space is equipped with a generalized Hitchin map. Via the universal Kobayashi-Hitchin correspondence, these moduli spaces are related to moduli spaces of solutions of certain vortex type equations. Potential applications include the study of representation spaces of the fundamental group of compact Riemann surfaces. The book concludes with a brief discussion of generalizations of these findings to higher dimensional base varieties, positive characteristic, and parabolic bundles. The text is fairly self-contained (e.g., the necessary background from the theory of principal bundles is included) and features numerous examples and exercises. It addresses students and researchers with a working knowledge of elementary algebraic geometry.

Algebraic Homogeneous Spaces and Invariant Theory Springer Science & Business Media

This book provides an introduction to geometric invariant theory from a differential geometric viewpoint. It is inspired by certain infinite-dimensional analogues of geometric invariant theory that arise naturally in several different areas of geometry. The central ingredients are the moment-weight inequality relating the Mumford numerical invariants to the norm of the moment map, the negative gradient flow of the moment map squared, and the Kempf--Ness function. The exposition is essentially self-contained, except for an appeal to the Lojasiewicz gradient inequality. A broad variety of examples illustrate the theory, and five appendices cover essential topics that go beyond the basic concepts of differential geometry. The comprehensive bibliography will be a valuable resource for researchers. The book is addressed to graduate students and researchers interested in geometric invariant theory and related subjects. It will be easily accessible to readers with a basic understanding of differential geometry and does not require any knowledge of algebraic geometry.

Geometric Invariant Theory; 2nd Ed., [by] D. Mumford [and] J. Fogarty Princeton University Press

Geometric invariant theory (GIT) provides a construction of quotients for projective algebraic varieties equipped with an action of a reductive algebraic group. Since its foundation by Mumford, GIT plays an important role in the construction of moduli (or parameter) spaces. More recently, its methods have been successfully applied to problems of representation theory. Many algebraic as well as geometric properties have been studied over the last few decades. One direction of our work is the study of projective normality of GIT quotient varieties for finite group actions and another direction is to study the semi-stable points for a maximal torus action on the homogeneous space G/P. Chapter 1 gives a brief account of the theory of algebraic groups. Chapter 2 is a survey of computational invariant theory of finite groups as well as reductive algebraic groups. In this chapter we present many classical as well as modern results in invariant theory. Chapter 3 is about torus action on G/P and In Chapter 4 we study the projective normality of GIT quotient varieties for the action of finite groups. At the end of this chapter we describe some of the questions that remain to be answered.

Differential Geometry in the Large Springer Science & Business Media

This book, dedicated to the memory of Gian-Carlo Rota, is the result of a collaborative effort by his friends, students and admirers. Rota was one of the great thinkers of our times, innovator in both mathematics and phenomenology. I feel moved, yet touched by a sense of sadness, in presenting this volume of work, despite the fear that I may be unworthy of the task that befalls me. Rota, both the scientist and the man, was marked by a generosity that knew no bounds. His ideas opened wide the horizons of fields of research, permitting an astonishing number of students from all over the globe to become enthusiastically involved. The contagious energy with which he demonstrated his tremendous mental capacity always proved fresh and inspiring. Beyond his renown as gifted scientist, what was particularly striking in Gian-Carlo Rota was his ability to appreciate the diverse intellectual capacities of those before him and to adapt his communications accordingly. This human sense, complemented by his acute appreciation of the importance of the individual, acted as a catalyst in bringing forth the very best in each one of his students. Whosoever was fortunate enough to enjoy Gian-Carlo Rota's longstanding friendship was most enriched by the experience, both mathematically and philosophically, and had occasion to appreciate son cote de bon vivant. The book opens with a heartfelt piece by Henry Crapo in which he meticulously pieces together what Gian-Carlo Rota's untimely demise has bequeathed to science.

Introduction to Moduli Problems and Orbit Spaces Springer Science & Business Media

The 2019 'Australian-German Workshop on Differential Geometry in the Large' represented an extraordinary cross section of topics across differential geometry, geometric analysis and differential topology. The two-week programme featured talks from prominent keynote speakers from across the globe, treating geometric evolution equations, structures on manifolds, non-negative curvature and Alexandrov geometry, and topics in differential topology. A joy to the expert and novice alike, this proceedings volume touches on topics as diverse as Ricci and mean curvature flow, geometric invariant theory, Alexandrov spaces, almost formality, prescribed Ricci curvature, and Kähler and Sasaki geometry.

Geometric Invariant Theory and Decorated Principal Bundles LAP Lambert Academic Publishing

Schubert varieties provide an inductive tool for studying flag varieties. This book is mainly a detailed account of a particularly interesting instance of their occurrence: namely, in relation to classical invariant theory. More precisely, it is about the connection between the first and second fundamental theorems of classical invariant theory on the one hand and standard monomial theory for Schubert varieties in certain special flag varieties on the other.

Geometric Invariant Theory for Polarized Curves American Mathematical Soc.

"Geometric Invariant Theory" by Mumford/Fogarty (the firstedition was published in 1965, a second, enlarged editonappeared in 1982) is the standard reference on applicationsof invariant theory to the construction of moduli spaces.This third, revised edition has been long awaited for by themathematical community. It is now appearing in a completelyupdated and enlarged version with an additional chapter onthe moment map by Prof. Frances Kirwan (Oxford) and a fullyupdated bibliography of work in this area.The book deals firstly with actions of algebraic groups onalgebraic varieties, separating orbits by invariants andconstructionquotient spaces; and secondly with applicationsof this theory to the construction of moduli spaces.It is a systematic exposition of the geometric aspects ofthe classical theory of polynomial invariants.