

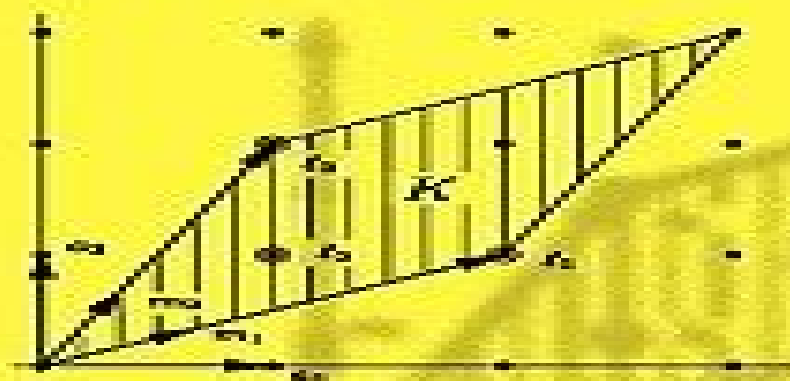
Invariant Theory
and Algebraic
Transformation Groups

VI

R. V. GANKRELEDGE
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Subject Editors

MARTIN LORENZ

Multiplicative Invariant Theory



Springer

Multiplicative Invariant Theory

Richard Kane



Multiplicative Invariant Theory:

Multiplicative Invariant Theory Martin Lorenz, 2005-03-10 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 Reflection Groups and Semigroup Algebras in Multiplicative Invariant Theory Mohammed S. Tesemma, 2004 **Multiplicative Invariants of Root Lattices** Jessica Ann Hamm, 2014 Classical invariant theory is a field of study within abstract algebra that has been around for well over a century However the field of multiplicative invariant theory is rather new having only been studied formally for the past 35 years Multiplicative invariants arise naturally in a variety of settings notably as representation rings of Lie algebras centers of group algebras and actions on algebraic tori In this thesis we calculate the multiplicative invariants for lattices associated to root systems under the actions of their Weyl groups *Computational Invariant Theory* Harm Derksen, Gregor Kemper, 2015-12-23 This book is about the computational aspects of invariant theory Of central interest is the question how the invariant ring of a given group action can be calculated Algorithms for this purpose form the main pillars around which the book is built There are two introductory chapters one on Gröbner basis methods and one on the basic concepts of invariant theory which prepare the ground for the algorithms Then algorithms for computing invariants of finite and reductive groups are discussed Particular emphasis lies on interrelations between structural properties of invariant rings and computational methods Finally the book contains a chapter on applications of invariant theory covering fields as disparate as graph theory coding theory dynamical systems and computer vision The book is intended for postgraduate students as well as researchers in geometry computer algebra and of course invariant theory The text is enriched with numerous explicit examples which illustrate the theory and should be of more than passing interest More than ten years after the first publication of the book the second edition now provides a major update and covers many recent developments in the field Among the roughly 100 added pages there are two appendices authored by Vladimir Popov and an addendum by Norbert A Campo and Vladimir Popov Modular Invariant Theory H.E.A. Eddy Campbell, David L. Wehlau, 2011-01-12 This book covers the modular invariant theory of finite groups the case when the characteristic of the field divides the order of the group a theory that is more complicated than the study of the classical non modular case Largely self contained the book develops the theory from its origins up to modern results It explores many examples illustrating the theory and its contrast

with the better understood non modular setting It details techniques for the computation of invariants for many modular representations of finite groups especially the case of the cyclic group of prime order It includes detailed examples of many topics as well as a quick survey of the elements of algebraic geometry and commutative algebra as they apply to invariant theory The book is aimed at both graduate students and researchers an introduction to many important topics in modern algebra within a concrete setting for the former an exploration of a fascinating subfield of algebraic geometry for the latter

Multiplicative Ideal Theory and Factorization Theory Scott Chapman,Marco Fontana,Alfred Geroldinger,Bruce Olberding,2016-07-29 This book consists of both expository and research articles solicited from speakers at the conference entitled Arithmetic and Ideal Theory of Rings and Semigroups held September 22-26 2014 at the University of Graz Graz Austria It reflects recent trends in multiplicative ideal theory and factorization theory and brings together for the first time in one volume both commutative and non commutative perspectives on these areas which have their roots in number theory commutative algebra and algebraic geometry Topics discussed include topological aspects in ring theory Prüfer domains of integer valued polynomials and their monadic submonoids and semigroup algebras It will be of interest to practitioners of mathematics and computer science and researchers in multiplicative ideal theory factorization theory number theory and algebraic geometry

Invariant Theory in All Characteristics Harold Edward Alexander Eddy Campbell,David L. Wehlau, This volume includes the proceedings of a workshop on Invariant Theory held at Queen's University Ontario The workshop was part of the theme year held under the auspices of the Centre de recherches mathématiques CRM in Montreal The gathering brought together two communities of researchers those working in characteristic 0 and those working in positive characteristic The book contains three types of papers survey articles providing introductions to computational invariant theory modular invariant theory of finite groups and the invariant theory of Lie groups expository works recounting recent research in these three areas and beyond and open problems of current interest The book is suitable for graduate students and researchers working in invariant theory

Invariant Theory Mara D. Neusel,2007 This book presents the characteristic zero invariant theory of finite groups acting linearly on polynomial algebras The author assumes basic knowledge of groups and rings and introduces more advanced methods from commutative algebra along the way The theory is illustrated by numerous examples and applications to physics engineering numerical analysis combinatorics coding theory and graph theory A wide selection of exercises and suggestions for further reading makes the book appropriate for an advanced undergraduate or first year graduate level course

The Invariant Theory of Matrices Corrado De Concini,Claudio Procesi,2017-11-16 This book gives a unified complete and self contained exposition of the main algebraic theorems of invariant theory for matrices in a characteristic free approach More precisely it contains the description of polynomial functions in several variables on the set of matrices with coefficients in an infinite field or even the ring of integers invariant under simultaneous conjugation Following Hermann Weyl's classical approach the ring of invariants is

described by formulating and proving 1 the first fundamental theorem that describes a set of generators in the ring of invariants and 2 the second fundamental theorem that describes relations between these generators The authors study both the case of matrices over a field of characteristic 0 and the case of matrices over a field of positive characteristic While the case of characteristic 0 can be treated following a classical approach the case of positive characteristic developed by Donkin and Zubkov is much harder A presentation of this case requires the development of a collection of tools These tools and their application to the study of invariants are explained in an elementary self contained way in the book

Geometric Invariant Theory Nolan R. Wallach, 2017-09-08 Geometric Invariant Theory GIT is developed in this text within the context of algebraic geometry over the real and complex numbers This sophisticated topic is elegantly presented with enough background theory included to make the text accessible to advanced graduate students in mathematics and physics with diverse backgrounds in algebraic and differential geometry Throughout the book examples are emphasized Exercises add to the reader's understanding of the material most are enhanced with hints The exposition is divided into two parts The first part Background Theory is organized as a reference for the rest of the book It contains two chapters developing material in complex and real algebraic geometry and algebraic groups that are difficult to find in the literature Chapter 1 emphasizes the relationship between the Zariski topology and the canonical Hausdorff topology of an algebraic variety over the complex numbers Chapter 2 develops the interaction between Lie groups and algebraic groups Part 2 Geometric Invariant Theory consists of three chapters 3 5 Chapter 3 centers on the Hilbert-Mumford theorem and contains a complete development of the Kempf-Ness theorem and Vinberg's theory Chapter 4 studies the orbit structure of a reductive algebraic group on a projective variety emphasizing Kostant's theory The final chapter studies the extension of classical invariant theory to products of classical groups emphasizing recent applications of the theory to physics

Algorithms in Invariant Theory Bernd Sturmfels, 2008-06-17 J Kung and G C Rota in their 1984 paper write Like the Arabian phoenix rising out of its ashes the theory of invariants pronounced dead at the turn of the century is once again at the forefront of mathematics The book of Sturmfels is both an easy to read textbook for invariant theory and a challenging research monograph that introduces a new approach to the algorithmic side of invariant theory The Groebner bases method is the main tool by which the central problems in invariant theory become amenable to algorithmic solutions Students will find the book an easy introduction to this classical and new area of mathematics Researchers in mathematics symbolic computation and computer science will get access to a wealth of research ideas hints for applications outlines and details of algorithms worked out examples and research problems

Reflection Groups and Invariant Theory Richard Kane, 2001-06-21 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

Invariant Theory Sebastian S. Koh, 2006-11-15 This volume of expository papers is the outgrowth of a conference in combinatorics and

invariant theory In recent years newly developed techniques from algebraic geometry and combinatorics have been applied with great success to some of the outstanding problems of invariant theory moving it back to the forefront of mathematical research once again This collection of papers centers on constructive aspects of invariant theory and opens with an introduction to the subject by F Grosshans Its purpose is to make the current research more accessible to mathematicians in related fields

Lie Groups and Invariant Theory Ernest Borisovich Vinberg, 2005 This volume devoted to the 70th birthday of A L Onishchik contains a collection of articles by participants in the Moscow Seminar on Lie Groups and Invariant Theory headed by E B Vinberg and A L Onishchik The book is suitable for graduate students and researchers interested in Lie groups and related topics

Group Actions on Rings Susan Montgomery, 1985 Ring theorists and researchers in invariant theory and operator algebra met at Bowdoin for the 1984 AMS IMS SIAM Joint Summer Research Conference to exchange ideas about group actions on rings This work discusses topics common to the three fields including K theory dual actions semi invariants and crossed products

Invariant Theory Robert M. Fossum, 1989 This volume contains the proceedings of the AMS Special Session on Invariant Theory held in Denton Texas in the fall of 1986 also included are several invited papers in this area The purpose of the conference was to exchange ideas on recent developments in algebraic group actions on algebraic varieties The papers fall into three main categories actions of linear algebraic groups flag manifolds and invariant theory and representation theory and invariant theory This book is likely to find a wide audience for invariant theory is connected to a range of mathematical fields such as algebraic groups algebraic geometry commutative algebra and representation theory

Infinite Crossed Products Donald S. Passman, 2013-07-24 This groundbreaking monograph in advanced algebra addresses crossed products which involve group and ring theory and the study of infinite group algebras group graded rings and the Galois theory of noncommutative rings 1989 edition

Geometric Invariant Theory for Polarized Curves Gilberto Bini, Fabio Felici, Margarida Melo, Filippo Viviani, 2014-11-07 We investigate GIT quotients of polarized curves More specifically we study the GIT problem for the Hilbert and Chow schemes of curves of degree d and genus g in a projective space of dimension $d + g$ as d decreases with respect to g We prove that the first three values of d at which the GIT quotients change are given by $d = 2g + 2$ where $g = 2, 3, 5, 4$ We show that for a 4 L Caporaso's results hold true for both Hilbert and Chow semistability If $3 \leq g \leq 5$

Algebraic Homogeneous Spaces and Invariant Theory Frank D. Grosshans, 2006-11-14 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

Invariant Theory T.A.

Springer,2006-11-14

Multiplicative Invariant Theory Book Review: Unveiling the Power of Words

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