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Nota di contenuto	Intro -- Preface -- Acknowledgments -- Contents -- 1 The Shestakov-Umirbaev Theory and Nagata's Conjecture -- 1.1 The Shestakov-Umirbaev Theory -- 1.1.1 Nagata's Conjecture -- 1.1.2 Weighted Grading -- 1.1.3 Initial Algebras and Elementary Reductions -- 1.1.4 Wildness Criterion -- 1.2 Structure of the Proof -- 1.2.1 Key Propositions -- 1.2.2 Induction -- 1.2.3 Proof of Claim A -- 1.2.4 Proof of Claim B -- Summary of Sect.1.2 -- 1.3 Degree Inequalities -- 1.3.1 Differentials -- 1.3.2 Shestakov-Umirbaev Inequality -- 1.3.3 Useful Consequences -- 1.3.4 Exercises -- 1.3.5 Degrees of Cofactor Expansions -- 1.4 Weak Shestakov-Umirbaev Condition -- 1.4.1 Description of g1 and g2 -- 1.4.2 Degree Estimations -- 1.5 Completion of the Proof -- 1.6 How to Find Reductions -- 1.6.1 Elementary Reduction -- 1.6.2 Shestakov-Umirbaev Reduction -- 2 Counterexamples to Hilbert's Fourteenth Problem -- 2.1 Introduction -- 2.2 Main Theorem -- 2.2.1 Construction -- 2.2.2 A Sufficient Condition on t2,...,tn -- 2.2.3 Example and Remarks -- 2.3 Criterion for Non-finite Generation -- 2.4 Proof of Theorem 2.2.4, Part I -- 2.5 Proof of Theorem 2.2.4, Part II -- 2.6 Application (1): Derivations -- 2.7 Application (2): Invariant Fields -- 3 Prime Characteristic Methods

and the Cancellation Problem -- 3.1 The Makar-Limanov and Derksen Invariants -- 3.2 Exponential Maps -- 3.3 Cancellation in Dimensions One and Two -- 3.4 Cancellation in Dimensions Three and Higher -- 4 The Jacobian Conjecture: New Equivalences -- 4.1 Preliminaries: Exterior Forms -- 4.2 The Canonical Poisson Algebra and the Poisson Conjecture -- 4.3 The Weyl Algebra and the Dixmier Conjecture -- Applications to the Case that R is a Domain -- 4.4 The Equivalence of the Dixmier, Jacobian, and Poisson Conjectures -- 4.5 A p-Adic Formulation of the Jacobian Conjecture and the Unimodular Conjecture -- Transitivity.
Keller Maps and the Unimodular Conjecture -- The Unimodular Conjecture over Zp -- 4.6 A Mysterious Faulty Proof of the Jacobian Conjecture -- 5 Mathieu-Zhao Spaces -- 5.1 Generalizing the Jacobian Conjecture -- 5.2 Mathieu-Zhao Spaces: Definition and Examples -- 5.3 Zhao's Idempotency Theorem -- 5.4 Orthogonal Polynomials and MZ-Spaces -- Orthogonal Polynomials -- 5.5 The Duistermaat-van der Kallen Theorem -- Polytopes -- The Density Theorem -- Applications of the Density Theorem -- Generalizing the Duistermaat-van der Kallen Theorems -- 5.6 The Generalized Vanishing Conjecture -- 5.7 The Image Conjecture -- 5.8 MZ-Spaces of Matrices of Codimension One -- Some Corrections to E1 -- Bibliography -- Index.

Sommario/riassunto

This book is an extension to Arno van den Essen's Polynomial Automorphisms and the Jacobian Conjecture published in 2000. Many new exciting results have been obtained in the past two decades, including the solution of Nagata's Conjecture, the complete solution of Hilbert's fourteenth problem, the equivalence of the Jacobian Conjecture and the Dixmier Conjecture, the symmetric reduction of the Jacobian Conjecture, the theory of Mathieu-Zhao spaces and counterexamples to the Cancellation problem in positive characteristic. These and many more results are discussed in detail in this work. The book is aimed at graduate students and researchers in the field of Affine Algebraic Geometry. Exercises are included at the end of each section.