Discriminant Equations in Diophantine Number Theory

Diophantine number theory is an active area that has seen tremendous progress over the past century. An important role in this theory is played by discriminant equations, a class of Diophantine equations with close ties to algebraic number theory, Diophantine approximation and Diophantine geometry. Discriminant equations are about univariate polynomials or binary forms of given discriminant, considered over various types of integral domains.

This book is the first comprehensive account of discriminant equations and their applications. It brings together many aspects, including effective results over number fields, effective results over finitely generated domains, practical algorithms for solving concrete equations, estimates on the number of solutions, applications to algebraic integers of given discriminant, power integral bases, canonical number systems, algorithms for finding a minimal set of generators of an order of a number field, root separation of polynomials and reduction of hyperelliptic curves. The authors' previous title, *Unit Equations in Diophantine Number Theory*, laid the groundwork by presenting important results that are used as tools in the present book. This material is briefly summarized in the introductory chapters along with the necessary basic algebra and algebraic number theory, making the book accessible to experts and young researchers alike.

Jan-Hendrik Evertse is a number theorist, working at the Mathematical Institute of Leiden University. His research concentrates on Diophantine approximation and applications to Diophantine problems. In this area he has obtained some influential results, in particular on estimates for the numbers of solutions of Diophantine equations and inequalities.

Kálmán Győry is Professor Emeritus at the University of Debrecen, a member of the Hungarian Academy of Sciences and a well-known researcher in Diophantine number theory. Over his career he has obtained several significant and pioneering results, among others on unit equations, decomposable form equations, and their various applications. Győry is also the founder and leader of the Number Theory Research Group in Debrecen, which consists of his former students and their descendants.

NEW MATHEMATICAL MONOGRAPHS

Editorial Board
Béla Bollobás, William Fulton, Anatole Katok, Frances Kirwan, Peter Sarnak,
Barry Simon, Burt Totaro

All the titles listed below can be obtained from good booksellers or from Cambridge University Press. For a complete series listing visit www.cambridge.org/mathematics.

1. M. Cabanes and M. Enguehard *Representation Theory of Finite Reductive Groups*
2. J. B. Garnett and D. E. Marshall *Harmonic Measure*
3. P. Cohn *Free Ideal Rings and Localization in General Rings*
4. E. Bombieri and W. Gubler *Heights in Diophantine Geometry*
5. Y. J. Ionin and M. S. Shrikhande *Combinatorics of Symmetric Designs*
6. S. Berhanu, P. D. Cordaro and J. Hounie *An Introduction to Involutive Structures*
7. A. Shlapentokh *Hilbert's Tenth Problem*
8. G. Michler *Theory of Finite Simple Groups I*
9. A. Baker and G. Wüstholz *Logarithmic Forms and Diophantine Geometry*
10. P. Kronheimer and T. Mrowka *Monopoles and Three-Manifolds*
11. B. Bekka, P. de la Harpe and A. Valette *Kazhdan's Property (T)*
12. J. Neisendorfer *Algebraic Methods in Unstable Homotopy Theory*
13. M. Grandis *Directed Algebraic Topology*
14. G. Michler *Theory of Finite Simple Groups II*
15. R. Schertz *Complex Multiplication*
16. S. Bloch *Lectures on Algebraic Cycles (2nd Edition)*
17. B. Conrad, O. Gabber and G. Prasad *Pseudo-reductive Groups*
18. T. Downarowicz *Entropy in Dynamical Systems*
19. C. Simpson *Homotopy Theory of Higher Categories*
20. E. Fricain and J. Mashreghi *The Theory of H(b) Spaces I*
21. E. Fricain and J. Mashreghi *The Theory of H(b) Spaces II*
22. J. Goubault-Larrecq *Non-Hausdorff Topology and Domain Theory*
23. J. Śniatycki *Differential Geometry of Singular Spaces and Reduction of Symmetry*
24. E. Riehl *Categorical Homotopy Theory*
25. B. A. Munson and I. Volić *Cubical Homotopy Theory*
26. B. Conrad, O. Gabber and G. Prasad *Pseudo-reductive Groups (2nd Edition)*
27. J. Heinonen, P. Koskela, N. Shanmugalingam and J. T. Tyson *Sobolev Spaces on Metric Measure Spaces*
28. Y.-G. Oh *Symplectic Topology and Floer Homology I*
29. Y.-G. Oh *Symplectic Topology and Floer Homology II*
30. A. Bobrowski *Convergence of One-Parameter Operator Semigroups*
31. K. Costello and O. Gwilliam *Factorization Algebras in Quantum Field Theory I*

Discriminant Equations in Diophantine Number Theory

JAN-HENDRIK EVERTSE
Leiden University, The Netherlands

KÁLMÁN GYŐRY
University of Debrecen, Hungary

CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781107097612

First published 2017

A catalog record for this publication is available from the British Library

ISBN 978-1-107-09761-2 Hardback

Contents