

Diophantine Approximations And Value Distribution Theory

Talks about Diophantine approximation and Nevanlinna theory. This text not only provides fresh results and directions, but also challenges open problems. It also presents the state of the art in the studies of the analogues between Diophantine approximation (in number theory) and value distribution theory (in complex analysis).

These are notes of lectures on Nevanlinna theory, in the classical case of meromorphic functions, and the generalization by Carlson-Griffith to equidimensional holomorphic maps using as domain space finite coverings of \mathbb{C} resp. \mathbb{C}^n . Conjecturally best possible error terms are obtained following a method of Ahlfors and Wong. This is especially significant when obtaining uniformity for the error term w.r.t. coverings, since the analytic yields case a strong version of Vojta's conjectures in the number-theoretic case involving the theory of heights. The counting function for the ramified locus in the analytic case is the analogue of the normalized logarithmic discriminant in the number-theoretic case, and is seen to occur with the expected coefficient 1. The error terms are given involving an approximating function (type function) similar to the probabilistic type function of Khitchine in number theory. The leisurely exposition allows readers with no background in Nevanlinna Theory to approach some of the basic remaining problems around the error term. It may be used as a continuation of a graduate course in complex analysis, also leading into complex differential geometry. This introduction to the theory of Diophantine approximation pays special regard to Schmidt's subspace theorem and to its applications to Diophantine equations and related topics. The geometric viewpoint on Diophantine equations has been adopted throughout the book. It includes a number of results, some published here for the first time in book form, and some new, as well as classical material presented in an accessible way. Graduate students and experts alike will find the book's broad approach useful for their work, and will discover new techniques and open questions to guide their research. It contains concrete examples and many exercises (ranging from the relatively simple to the much more complex), making it ideal for self-study and enabling readers to quickly grasp the essential concepts.

This volume contains three long lecture series by J.L. Colliot-Thelene, Kazuya Kato and P. Vojta. Their topics are respectively the connection between algebraic K-theory and the torsion algebraic cycles on an algebraic variety, a new approach to Iwasawa theory for Hasse-Weil L-function, and the applications of arithmetic geometry to Diophantine approximation. They contain many new results at a very advanced level, but also surveys of the state of the art on the subject with complete, detailed proofs and a lot of background. Hence they can be useful to readers with very different background and experience. CONTENTS: J.L. Colliot-Thelene: Cycles algebriques de torsion et K-theorie algebrique.- K. Kato: Lectures on the approach to Iwasawa theory for Hasse-Weil L-functions.- P. Vojta: Applications of arithmetic

algebraic geometry to diophantine approximations.

There is almost no field in Mathematics which does not use Mathematical Analysis. Computer methods in Applied Mathematics, too, are often based on statements and procedures of Mathematical Analysis. An important part of Mathematical Analysis is Complex Analysis because it has many applications in various branches of Mathematics. Since the field of Complex Analysis and its applications is a focal point in the Vietnamese research programme, the Hanoi University of Technology organized an International Conference on Finite or Infinite Dimensional Complex Analysis and Applications which took place in Hanoi from August 8 - 12, 2001. This conference was the 9th in a series of conferences which take place alternately in China, Japan, Korea and Vietnam each year. The first one took place at Pusan University in Korea in 1993. The preceding 8th conference was held in Shandong in China in August 2000. The 9th conference was the first one which took place above mentioned series of conferences in Vietnam. Present trends in Complex Analysis reflected in the present volume are mainly concentrated in the following four research directions: 1 Value distribution theory (including meromorphic functions, meromorphic mappings, as well as p -adic functions over fields of finite or zero characteristic) and its applications, 2 Holomorphic functions in several (finitely or infinitely many) complex variables, 3 Clifford Analysis, i.e., complex methods in higher-dimensional real Euclidean spaces, 4 Generalized analytic functions.

The book timely surveys new research results and related developments in Diophantine approximation, a division of number theory which deals with the approximation of real numbers by rational numbers. The book is appended with a list of challenging open problems and a comprehensive list of references. From the contents: Field extensions • Algebraic numbers • Algebraic geometry • Height functions • The abc-conjecture • Roth's theorem • Subspace theorems • Vojta's conjectures • L-functions.

This volume contains 21 research and survey papers on recent developments in the field of diophantine approximation, which are based on lectures given at a conference at the Erwin Schrödinger-Institute (Vienna, 2003). The articles are either in the spirit of more classical diophantine analysis or of a geometric or combinatorial flavor. Several articles deal with estimates for the number of solutions of diophantine equations as well as with congruences and polynomials.

This book contains the proceedings of the international workshop on global sustainability held in Benevento, Italy, on February 2014. The proceedings consist of 10 invited and contributed papers related to the broad range of aspects of sustainability in a global scenario including food safety, monitoring, soil mapping, healthcare, territorial intelligence, local food production, greenhouse gas emissions, renewable energy sources, integrated development, sustainability strategies, "smart" bio-territories, replete with case studies. This book aims to provide the perspective of the diverse problems in global sustainability, and the many

disciplines that could work together in achieving it. The workshop itself led to the signing of international agreements for the protection and enhancement of endangered species in the area of North Africa.

This monograph is a bridge between the classical theory and modern approach via arithmetic geometry.

Since the appearance of Kobayashi's book, there have been several results at the basic level of hyperbolic spaces, for instance Brody's theorem, and results of Green, Kiernan, Kobayashi, Noguchi, etc. which make it worthwhile to have a systematic exposition. Although of necessity I reproduce some theorems from Kobayashi, I take a different direction, with different applications in mind, so the present book does not supersede Kobayashi's. My interest in these matters stems from their relations with diophantine geometry. Indeed, if X is a projective variety over the complex numbers, then I conjecture that X is hyperbolic if and only if X has only a finite number of rational points in every finitely generated field over the rational numbers. There are also a number of subsidiary conjectures related to this one. These conjectures are qualitative. Vojta has made quantitative conjectures by relating the Second Main Theorem of Nevanlinna theory to the theory of heights, and he has conjectured bounds on heights stemming from inequalities having to do with diophantine approximations and implying both classical and modern conjectures. Noguchi has looked at the function field case and made substantial progress, after the line started by Grauert and Grauert-Reckziegel and continued by a recent paper of Riebesehl. The book is divided into three main parts: the basic complex analytic theory, differential geometric aspects, and Nevanlinna theory. Several chapters of this book are logically independent of each other.

This volume comprises the proceedings of a conference on the geometric analysis of several complex variables held at POSTECH in June 1997. The conference was attended by scientists and students from around the globe. Each of the five plenary speakers at the conference gave a short course on a topic of current interest in the field. The lecture write-ups contain cogent and accessible information intended for a broad audience. The volume also includes a tutorial in several complex variables given by Kim and Krantz at the conference. This tutorial is geared toward helping the novice to understand the rest of the material in the book. The bibliographies of the papers give students and young mathematicians a valuable resource for future learning on the topic. This book provides a substantial overview on areas of current activity. Required background for understanding the text is a solid undergraduate education in mathematics and familiarity with first-year graduate studies in real and complex analysis. Some exposure to geometry would be helpful. The book is also suitable for use as a supplemental course text.

Arithmetic Geometry can be defined as the part of Algebraic Geometry connected with the study of algebraic varieties through arbitrary rings, in particular through non-algebraically closed fields. It lies at the intersection between classical algebraic geometry and number theory. A C.I.M.E. Summer School devoted to arithmetic geometry was held in Cetraro, Italy in September 2007, and presented some of the most interesting new developments in arithmetic geometry. This book collects the lecture notes which were written up by the speakers. The main topics concern diophantine equations, local-global principles, diophantine approximation and its relations to Nevanlinna theory, and rationally connected varieties. The book is divided into three parts, corresponding to the

courses given by J-L Colliot-Thelene, Peter Swinnerton Dyer and Paul Vojta.

Diophantine Approximations and Value Distribution Theory Springer
Diophantine Approximations and Value Distribution Theory Springer Verlag
Value Distribution Theory Related to Number Theory Birkhäuser

While its roots reach back to the third century, diophantine analysis continues to be an extremely active and powerful area of number theory. Many diophantine problems have simple formulations, they can be extremely difficult to attack, and many open problems and conjectures remain. Diophantine Analysis examines the theory of diophantine approximations and the theory of diophantine equations, with emphasis on interactions between these subjects. Beginning with the basic principles, the author develops his treatment around the theory of continued fractions and examines the classic theory, including some of its applications. He also explores modern topics rarely addressed in other texts, including the abc conjecture, the polynomial Pell equation, and the irrationality of the zeta function and touches on topics and applications related to discrete mathematics, such as factoring methods for large integers. Setting the stage for tackling the field's many open problems and conjectures, Diophantine Analysis is an ideal introduction to the fundamentals of this venerable but still dynamic field. A detailed appendix supplies the necessary background material, more than 200 exercises reinforce the concepts, and engaging historical notes bring the subject to life.

Number Theory is more than a comprehensive treatment of the subject. It is an introduction to topics in higher level mathematics, and unique in its scope; topics from analysis, modern algebra, and discrete mathematics are all included. The book is divided into two parts. Part A covers key concepts of number theory and could serve as a first course on the subject. Part B delves into more advanced topics and an exploration of related mathematics. The prerequisites for this self-contained text are elements from linear algebra. Valuable references for the reader are collected at the end of each chapter. It is suitable as an introduction to higher level mathematics for undergraduates, or for self-study.

A co-publication of the AMS and Bar-Ilan University This volume contains the proceedings of the Seventh International Conference on Complex Analysis and Dynamical Systems, held from May 10–15, 2015, in Nahariya, Israel. The papers in this volume range over a wide variety of topics in the interaction between various branches of mathematical analysis. Taken together, the articles collected here provide the reader with a panorama of activity in complex analysis, geometry, harmonic analysis, and partial differential equations, drawn by a number of leading figures in the field. They testify to the continued vitality of the interplay between classical and modern analysis.

The European Congress of Mathematics, held every four years, has established itself as a major international mathematical event. Following those in Paris, 1992, Budapest, 1996, and Barcelona, 2000, the Fourth European Congress of Mathematics took place in Stockholm, Sweden, June 27 to July 2, 2004, with 913 participants from 65 countries. Apart from seven plenary and thirty three invited lectures, there were six Science Lectures covering the most relevant aspects of mathematics in science and technology. Moreover, twelve projects of the EU Research Training Networks in Mathematics and Information Sciences, as well as Programmes from the European Science Foundation in Physical and Engineering Sciences, were presented. Ten EMS Prizes were awarded to young European mathematicians who have made a particular contribution to the progress of mathematics. Five of the prizewinners were independently chosen by the 4ECM Scientific Committee

Read Book Diophantine Approximations And Value Distribution Theory

as plenary or invited speakers. The other five prizewinners gave their lectures in parallel sessions. Most of these contributions are now collected in this volume, providing a permanent record of so much that is best in mathematics today.

This book describes the theories and developments in Nevanlinna theory and Diophantine approximation. Although these two subjects belong to the different areas: one in complex analysis and one in number theory, it has been discovered that a number of striking similarities exist between these two subjects. A growing understanding of these connections has led to significant advances in both fields. Outstanding conjectures from decades ago are being solved. Over the past 20 years since the first edition appeared, there have been many new and significant developments. The new edition greatly expands the materials. In addition, three new chapters were added. In particular, the theory of algebraic curves, as well as the algebraic hyperbolicity, which provided the motivation for the Nevanlinna theory.

These notes present recent results in the value-distribution theory of L-functions with emphasis on the phenomenon of universality. In 1975, Voronin proved that any non-vanishing analytic function can be approximated uniformly by certain shifts of the Riemann zeta-function in the critical strip. This spectacular universality property has a strong impact on the zero-distribution: Riemann's hypothesis is true if and only if the Riemann zeta-function can approximate itself uniformly (in the sense of Voronin). Meanwhile universality is proved for a large zoo of Dirichlet series, and it is conjectured that all reasonable L-functions are universal. In these notes we prove universality for polynomial Euler products. Our approach follows mainly Bagchi's probabilistic method. We further discuss related topics as, e.g., almost periodicity, density estimates, Nevanlinna theory, and functional independence.

This volume contains six detailed papers written by participants of the special session on value distribution theory and complex dynamics held in Hong Kong at the First Joint International Meeting of the AMS and the Hong Kong Mathematical Society in December 2000. It demonstrates the strong interconnections between the two fields and introduces recent progress of leading researchers from Asia. In the book, W. Bergweiler discusses proper analytic maps with one critical point and generalizes a previous result concerning Leau domains. W. Cherry and J. Wang discuss non-Archimedean analogs of Picard's theorems. P.-C. Hu and C.-C. Yang give a survey of results in non-Archimedean value distribution theory related to unique range sets, the abc -conjecture, and Shiffman's conjecture. L. Keen and J. Kotus explore the dynamics of the family of $f_\lambda(z) = \lambda \tan(z)$ and show that it has much in common with the dynamics of the familiar quadratic family $f_c(z) = z^2 + c$. R. Oudkerk discusses the interesting phenomenon known as parabolic implosion and, in particular, shows the persistence of Fatou coordinates under perturbation. Finally, M. Taniguchi discusses deformation spaces of entire functions and their combinatorial structure of singularities of the functions. The book is intended for graduate students and research mathematicians interested in complex dynamics, function theory, and non-Archimedean function theory.

This book covers the whole spectrum of number theory, and is composed of contributions from some of the best specialists worldwide.

The aim of this book is to provide a comprehensive account of higher dimensional Nevanlinna theory and its relations with Diophantine approximation theory for graduate students and interested researchers. This book with nine chapters systematically describes Nevanlinna theory of meromorphic maps between algebraic varieties or complex spaces, building up from the classical theory of meromorphic functions on the complex plane with full proofs in Chap. 1 to the current state of research. Chapter 2 presents the First Main Theorem for coherent ideal sheaves in a very general form. With the preparation of plurisubharmonic functions, how the theory to be generalized in a higher dimension is described.

In Chap. 3 the Second Main Theorem for differentiably non-degenerate meromorphic maps by Griffiths and others is proved as a prototype of higher dimensional Nevanlinna theory. Establishing such a Second Main Theorem for entire curves in general complex algebraic varieties is a wide-open problem. In Chap. 4, the Cartan-Nochka Second Main Theorem in the linear projective case and the Logarithmic Bloch-Ochiai Theorem in the case of general algebraic varieties are proved. Then the theory of entire curves in semi-abelian varieties, including the Second Main Theorem of Noguchi-Winkelmann-Yamanoi, is dealt with in full details in Chap. 6. For that purpose Chap. 5 is devoted to the notion of semi-abelian varieties. The result leads to a number of applications. With these results, the Kobayashi hyperbolicity problems are discussed in Chap. 7. In the last two chapters Diophantine approximation theory is dealt with from the viewpoint of higher dimensional Nevanlinna theory, and the Lang-Vojta conjecture is confirmed in some cases. In Chap. 8 the theory over function fields is discussed. Finally, in Chap. 9, the theorems of Roth, Schmidt, Faltings, and Vojta over number fields are presented and formulated in view of Nevanlinna theory with results motivated by those in Chaps. 4, 6, and 7.

This monograph serves as a self-contained introduction to Nevanlinna's theory of value distribution as well as a valuable reference for research specialists. Authors present, for the first time in book form, the most modern and refined versions of the Second Main Theorem with precise error terms, in both the geometric and logarithmic derivative based approaches. A unique feature of the monograph is its number theoretic digressions. These special sections assume no background in number theory and explore the exciting interconnections between Nevanlinna theory and the theory of Diophantine approximation.

The 13 chapters of this book centre around the proof of Theorem 1 of Faltings' paper "Diophantine approximation on abelian varieties", Ann. Math. 133 (1991) and together give an approach to the proof that is accessible to Ph.D-level students in number theory and algebraic geometry. Each chapter is based on an instructional lecture given by its author at a special conference for graduate students, on the topic of Faltings' paper.

These lecture notes originate from a course delivered at the Scuola Normale in Pisa in 2006. Generally speaking, the prerequisites do not go beyond basic mathematical material and are accessible to many undergraduates. The contents mainly concern diophantine problems on affine curves, in practice describing the integer solutions of equations in two variables. This case historically suggested some major ideas for more general problems. Starting with linear and quadratic equations, the important connections with Diophantine Approximation are presented and Thue's celebrated results are proved in full detail. In later chapters more modern issues on heights of algebraic points are dealt with, and applied to a sharp quantitative treatment of the unit equation. The book also contains several supplements, hinted

exercises and an appendix on recent work on heights.

The series is aimed specifically at publishing peer reviewed reviews and contributions presented at workshops and conferences. Each volume is associated with a particular conference, symposium or workshop. These events cover various topics within pure and applied mathematics and provide up-to-date coverage of new developments, methods and applications.

The subject of the book is Diophantine approximation and Nevanlinna theory. This book proves not just some new results and directions but challenging open problems in Diophantine approximation and Nevanlinna theory. The authors' newest research activities on these subjects over the past eight years are collected here. Some of the significant findings are the proof of Green-Griffiths conjecture by using meromorphic connections and Jacobian sections, generalized abc-conjecture, and more.

This volume contains the Proceedings of the International Workshop "Complex Analysis", which was held from February 12-16, 1990, in Wuppertal (Germany) in honour of H. Grauert, one of the most creative mathematicians in Complex Analysis of this century. In complete accordance with the width of the work of Grauert the book contains research notes and longer articles of many important mathematicians from all areas of Complex Analysis (Altogether there are 49 articles in the volume). Some of the main subjects are: Cauchy-Riemann Equations with estimates, q -convexity, CR structures, deformation theory, envelopes of holomorphy, function algebras, complex group actions, Hodge theory, instantons, Kähler geometry, Lefschetz theorems, holomorphic mappings, Nevanlinna theory, complex singularities, twistor theory, uniformization.

This self-contained treatment covers approximation of irrationals by rationals, product of linear forms, multiples of an irrational number, approximation of complex numbers, and product of complex linear forms. 1963 edition.

Serge Lang is not only one of the top mathematicians of our time, but also an excellent writer. He has made innumerable and invaluable contributions in diverse fields of mathematics and was honoured with the Cole Prize by the American Mathematical Society as well as with the Prix Carrière by the French Academy of Sciences. Here, 83 of his research papers are collected in four volumes, ranging over a variety of topics of interest to many readers.

Diophantine number theory is an active area that has seen tremendous growth over the past century, and in this theory unit equations play a central role. This comprehensive treatment is the first volume devoted to these equations. The authors gather together all the most important results and look at many different aspects, including effective results on unit equations over number fields, estimates on the number of solutions, analogues for function fields and effective results for unit equations over finitely generated domains. They also present a variety of applications. Introductory chapters provide the necessary background in algebraic number theory and function field theory, as well as an account of the required tools from Diophantine approximation and transcendence theory. This makes the book suitable for young researchers as well as experts who are looking for an up-to-date overview of the field.

Read Book Diophantine Approximations And Value Distribution Theory

Hermann Weyl considered value distribution theory to be the greatest mathematical achievement of the first half of the 20th century. The present lectures show that this beautiful theory is still growing. An important tool is complex approximation and some of the lectures are devoted to this topic. Harmonic approximation started to flourish astonishingly rapidly towards the end of the 20th century, and the latest development, including approximation manifolds, are presented here. Since de Branges confirmed the Bieberbach conjecture, the primary problem in geometric function theory is to find the precise value of the Bloch constant. After more than half a century without progress, a breakthrough was recently achieved and is presented. Other topics are also presented, including Jensen measures. A valuable introduction to currently active areas of complex analysis and potential theory. Can be read with profit by both students of analysis and research mathematicians.

This is a selection of high quality articles on number theory by leading figures.

This is an introduction to diophantine geometry at the advanced graduate level. The book contains a proof of the Mordell conjecture which will make it quite attractive to graduate students and professional mathematicians. In each part of the book, the reader will find numerous exercises.

[Copyright: 9b16054dc4a645f9c96d28df02f01d74](#)