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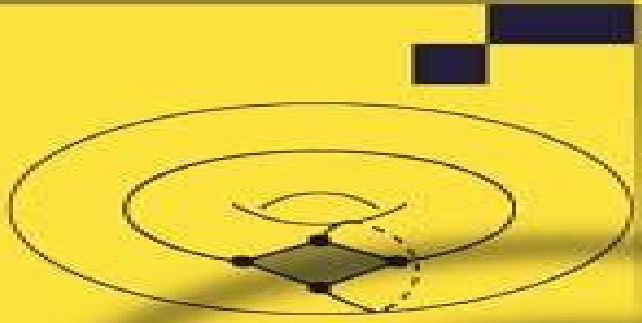

Graphs on Surfaces and Their Applications

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Graphs On Surfaces And Their Applications Encyclopaedia Of Mathematical Sciences

Sergey Novikov,Igor Krichever,Oleg Ogievetsky,Senya Shlosman

Graphs On Surfaces And Their Applications Encyclopaedia Of Mathematical Sciences:

Graphs on Surfaces and Their Applications Sergei K. Lando,Alexander K. Zvonkin,2013-04-17 Graphs drawn on two dimensional surfaces have always attracted researchers by their beauty and by the variety of difficult questions to which they give rise The theory of such embedded graphs which long seemed rather isolated has witnessed the appearance of entirely unexpected new applications in recent decades ranging from Galois theory to quantum gravity models and has become a kind of a focus of a vast field of research The book provides an accessible introduction to this new domain including such topics as coverings of Riemann surfaces the Galois group action on embedded graphs Grothendieck s theory of dessins d enfants the matrix integral method moduli spaces of curves the topology of meromorphic functions and combinatorial aspects of Vassiliev s knot invariants and in an appendix by Don Zagier the use of finite group representation theory The presentation is concrete throughout with numerous figures examples including computer calculations and exercises and should appeal to both graduate students and researchers Graphs on Surfaces Joanna A. Ellis-Monaghan,Iain Moffatt,2013-06-28 Graphs on Surfaces Dualities Polynomials and Knots offers an accessible and comprehensive treatment of recent developments on generalized duals of graphs on surfaces and their applications The authors illustrate the interdependency between duality medial graphs and knots how this interdependency is reflected in algebraic invariants of graphs and knots and how it can be exploited to solve problems in graph and knot theory Taking a constructive approach the authors emphasize how generalized duals and related ideas arise by localizing classical constructions such as geometric duals and Tait graphs and then removing artificial restrictions in these constructions to obtain full extensions of them to embedded graphs The authors demonstrate the benefits of these generalizations to embedded graphs in chapters describing their applications to graph polynomials and knots Graphs on Surfaces Dualities Polynomials and Knots also provides a self contained introduction to graphs on surfaces generalized duals topological graph polynomials and knot polynomials that is accessible both to graph theorists and to knot theorists Directed at those with some familiarity with basic graph theory and knot theory this book is appropriate for graduate students and researchers in either area Because the area is advancing so rapidly the authors give a comprehensive overview of the topic and include a robust bibliography aiming to provide the reader with the necessary foundations to stay abreast of the field The reader will come away from the text convinced of advantages of considering these higher genus analogues of constructions of plane and abstract graphs and with a good understanding of how they arise **Fractal Geometry and Stochastics IV** Christoph Bandt,Peter Mörters,Martina Zähle,2010-01-08 Over the last fifteen years fractal geometry has established itself as a substantial mathematical theory in its own right The interplay between fractal geometry analysis and stochastics has highly influenced recent developments in mathematical modeling of complicated structures This process has been forced by problems in these areas related to applications in statistical physics biomathematics and finance This book is a collection of survey articles covering many of the most recent developments like Schramm Loewner evolution

fractal scaling limits exceptional sets for percolation and heat kernels on fractals The authors were the keynote speakers at the conference Fractal Geometry and Stochastics IV at Greifswald in September 2008 **Encyclopedia of Knot Theory** Colin Adams,Erica Flapan,Allison Henrich,Louis H. Kauffman,Lewis D. Ludwig,Sam Nelson,2021-02-10 Knot theory is a fascinating mathematical subject with multiple links to theoretical physics This enyclopedia is filled with valuable information on a rich and fascinating subject Ed Witten Recipient of the Fields Medal I spent a pleasant afternoon perusing the Encyclopedia of Knot Theory It s a comprehensive compilation of clear introductions to both classical and very modern developments in the field It will be a terrific resource for the accomplished researcher and will also be an excellent way to lure students both graduate and undergraduate into the field Abigail Thompson Distinguished Professor of Mathematics at University of California Davis Knot theory has proven to be a fascinating area of mathematical research dating back about 150 years Encyclopedia of Knot Theory provides short interconnected articles on a variety of active areas in knot theory and includes beautiful pictures deep mathematical connections and critical applications Many of the articles in this book are accessible to undergraduates who are working on research or taking an advanced undergraduate course in knot theory More advanced articles will be useful to graduate students working on a related thesis topic to researchers in another area of topology who are interested in current results in knot theory and to scientists who study the topology and geometry of biopolymers Features Provides material that is useful and accessible to undergraduates postgraduates and full time researchers Topics discussed provide an excellent catalyst for students to explore meaningful research and gain confidence and commitment to pursuing advanced degrees Edited and contributed by top researchers in the field of knot theory

Automorphisms of Riemann Surfaces, Subgroups of Mapping Class Groups and Related Topics Aaron Wootton,S. Allen Broughton,Jennifer Paulhus,2022-02-03 Automorphism groups of Riemann surfaces have been widely studied for almost 150 years This area has persisted in part because it has close ties to many other topics of interest such as number theory graph theory mapping class groups and geometric and computational group theory In recent years there has been a major revival in this area due in part to great advances in computer algebra systems and progress in finite group theory This volume provides a concise but thorough introduction for newcomers to the area while at the same time highlighting new developments for established researchers The volume starts with two expository articles The first of these articles gives a historical perspective of the field with an emphasis on highly symmetric surfaces such as Hurwitz surfaces The second expository article focuses on the future of the field outlining some of the more popular topics in recent years and providing 78 open research problems across all topics The remaining articles showcase new developments in the area and have specifically been chosen to cover a variety of topics to illustrate the range of diversity within the field Handbook of the Tutte Polynomial and Related Topics Joanna A. Ellis-Monaghan,Iain Moffatt,2022-07-06 The Tutte Polynomial touches on nearly every area of combinatorics as well as many other fields including statistical mechanics coding theory and DNA sequencing It

is one of the most studied graph polynomials Handbook of the Tutte Polynomial and Related Topics is the first handbook published on the Tutte Polynomial It consists of thirty four chapters written by experts in the field which collectively offer a concise overview of the polynomial s many properties and applications Each chapter covers a different aspect of the Tutte polynomial and contains the central results and references for its topic The chapters are organized into six parts Part I describes the fundamental properties of the Tutte polynomial providing an overview of the Tutte polynomial and the necessary background for the rest of the handbook Part II is concerned with questions of computation complexity and approximation for the Tutte polynomial Part III covers a selection of related graph polynomials Part IV discusses a range of applications of the Tutte polynomial to mathematics physics and biology Part V includes various extensions and generalizations of the Tutte polynomial and Part VI provides a history of the development of the Tutte polynomial Features Written in an accessible style for non experts yet extensive enough for experts Serves as a comprehensive and accessible introduction to the theory of graph polynomials for researchers in mathematics physics and computer science Provides an extensive reference volume for the evaluations theorems and properties of the Tutte polynomial and related graph matroid and knot invariants Offers broad coverage touching on the wide range of applications of the Tutte polynomial and its various specializations Introduction to Compact Riemann Surfaces and Dessins d'Enfants Ernesto Girondo,Gabino González-Diez,2011-12-22 Few books on the subject of Riemann surfaces cover the relatively modern theory of dessins d enfants children s drawings which was launched by Grothendieck in the 1980s and is now an active field of research In this 2011 book the authors begin with an elementary account of the theory of compact Riemann surfaces viewed as algebraic curves and as quotients of the hyperbolic plane by the action of Fuchsian groups of finite type They then use this knowledge to introduce the reader to the theory of dessins d enfants and its connection with algebraic curves defined over number fields A large number of worked examples are provided to aid understanding so no experience beyond the undergraduate level is required Readers without any previous knowledge of the field of dessins d enfants are taken rapidly to the forefront of current research Algebraic Geometry and Number Theory Hussein Mourtada,Celal Cem Sarıoğlu,Christophe Soulé,Ayberk Zeytin,2017-05-07 This lecture notes volume presents significant contributions from the Algebraic Geometry and Number Theory Summer School held at Galatasaray University Istanbul June 2 13 2014 It addresses subjects ranging from Arakelov geometry and Iwasawa theory to classical projective geometry birational geometry and equivariant cohomology Its main aim is to introduce these contemporary research topics to graduate students who plan to specialize in the area of algebraic geometry and or number theory All contributions combine main concepts and techniques with motivating examples and illustrative problems for the covered subjects Naturally the book will also be of interest to researchers working in algebraic geometry number theory and related fields Tau Functions and their Applications John Harnad,Ferenc Balogh,2021-02-04 Tau functions are a central tool in the modern theory of integrable systems This volume

provides a thorough introduction starting from the basics and extending to recent research results It covers a wide range of applications including generating functions for solutions of integrable hierarchies correlation functions in the spectral theory of random matrices and combinatorial generating functions for enumerative geometrical and topological invariants A self contained summary of more advanced topics needed to understand the material is provided as are solutions and hints for the various exercises and problems that are included throughout the text to enrich the subject matter and engage the reader Building on knowledge of standard topics in undergraduate mathematics and basic concepts and methods of classical and quantum mechanics this monograph is ideal for graduate students and researchers who wish to become acquainted with the full range of applications of the theory of tau functions **Large Random Matrices: Lectures on Macroscopic Asymptotics** Alice Guionnet,2009-04-20 Random matrix theory has developed in the last few years in connection with various fields of mathematics and physics These notes emphasize the relation with the problem of enumerating complicated graphs and the related large deviations questions Such questions are also closely related with the asymptotic distribution of matrices which is naturally defined in the context of free probability and operator algebra The material of this volume is based on a series of nine lectures given at the Saint Flour Probability Summer School 2006 Lectures were also given by Maury Bramson and Steffen Lauritzen **Extremal Polynomials and Riemann Surfaces** Andrei Bogatyrev,2012-05-31 The problems of conditional optimization of the uniform or C norm for polynomials and rational functions arise in various branches of science and technology Their numerical solution is notoriously difficult in case of high degree functions The book develops the classical Chebyshev s approach which gives analytical representation for the solution in terms of Riemann surfaces The techniques born in the remote at the first glance branches of mathematics such as complex analysis Riemann surfaces and Teichm ller theory foliations braids topology are applied to approximation problems The key feature of this book is the usage of beautiful ideas of contemporary mathematics for the solution of applied problems and their effective numerical realization This is one of the few books where the computational aspects of the higher genus Riemann surfaces are illuminated Effective work with the moduli spaces of algebraic curves provides wide opportunities for numerical experiments in mathematics and theoretical physics **Probability and Statistical Physics in Two and More Dimensions** Clay Mathematics Institute. Summer School,2012 This volume is a collection of lecture notes for six of the ten courses given in Buzios Brazil by prominent probabilists at the 2010 Clay Mathematics Institute Summer School Probability and Statistical Physics in Two and More Dimensions and at the XIV Brazilian School of Probability In the past ten to fifteen years various areas of probability theory related to statistical physics disordered systems and combinatorics have undergone intensive development A number of these developments deal with two dimensional random structures at their critical points and provide new tools and ways of coping with at least some of the limitations of Conformal Field Theory that had been so successfully developed in the theoretical physics community to understand phase transitions of two dimensional systems

Included in this selection are detailed accounts of all three foundational courses presented at the Clay school Schramm Loewner Evolution and other Conformally Invariant Objects Noise Sensitivity and Percolation Scaling Limits of Random Trees and Planar Maps together with contributions on Fractal and Multifractal properties of SLE and Conformal Invariance of Lattice Models Finally the volume concludes with extended articles based on the courses on Random Polymers and Self Avoiding Walks given at the Brazilian School of Probability during the final week of the school Together these notes provide a panoramic state of the art view of probability theory areas related to statistical physics disordered systems and combinatorics Like the lectures themselves they are oriented towards advanced students and postdocs but experts should also find much of interest **Applications of Group Theory to Combinatorics** Jack Koolen,Jin Ho Kwak,Ming-Yao Xu,2008-07-02 Applications of Group Theory to Combinatorics contains 11 survey papers from international experts in combinatorics group theory and combinatorial topology The contributions cover topics from quite a diverse spectrum such as design theory Belyi functions group theory transitive graphs regular maps and Hurwitz problems and present the state

Integrability, Quantization, and Geometry: I. Integrable Systems Sergey Novikov,Igor Krichever,Oleg Ogievetsky,Senya Shlosman,2021-04-12 This book is a collection of articles written in memory of Boris Dubrovin 1950 2019 The authors express their admiration for his remarkable personality and for the contributions he made to mathematical physics For many of the authors Dubrovin was a friend colleague inspiring mentor and teacher The contributions to this collection of papers are split into two parts Integrable Systems and Quantum Theories and Algebraic Geometry reflecting the areas of main scientific interests of Dubrovin Chronologically these interests may be divided into several parts integrable systems integrable systems of hydrodynamic type WDVV equations Frobenius manifolds isomonodromy equations flat connections and quantum cohomology The articles included in the first part are more or less directly devoted to these areas primarily with the first three listed above The second part contains articles on quantum theories and algebraic geometry and is less directly connected with Dubrovin s early interests Knot Theory Vassily Olegovich Manturov,2018-04-17 Over the last fifteen years the face of knot theory has changed due to various new theories and invariants coming from physics topology combinatorics and alge bra It suffices to mention the great progress in knot homology theory Khovanov homology and Ozsvath Szabo Heegaard Floer homology the A polynomial which give rise to strong invariants of knots and 3 manifolds in particular many new unknot detectors New to this Edition is a discussion of Heegaard Floer homology theory and A polynomial of classical links as well as updates throughout the text Knot Theory Second Edition is notable not only for its expert presentation of knot theory s state of the art but also for its accessibility It is valuable as a profes sional reference and will serve equally well as a text for a course on knot theory *Geometry, Groups and Dynamics* C. S. Aravinda,William M. Goldman, Krishnendu Gongopadhyay, Alexander Lubotzky, Mahan Mj,Anthony Weaver,2015-05-01 This volume contains the proceedings of the ICTS Program Groups Geometry and Dynamics held December 3 16 2012 at CEMS Almora India The

activity was an academic tribute to Ravi S Kulkarni on his turning seventy Articles included in this volume both introductory and advanced surveys represent the broad area of geometry that encompasses a large portion of group theory finite or otherwise and dynamics in its proximity These areas have been influenced by Kulkarni s ideas and are closely related to his work and contribution Representation Theory of Symmetric Groups Pierre-Loic Meliot,2017-05-12 Representation Theory of Symmetric Groups is the most up to date abstract algebra book on the subject of symmetric groups and representation theory Utilizing new research and results this book can be studied from a combinatorial algorithmic or algebraic viewpoint This book is an excellent way of introducing today s students to representation theory of the symmetric groups namely classical theory From there the book explains how the theory can be extended to other related combinatorial algebras like the Iwahori Hecke algebra In a clear and concise manner the author presents the case that most calculations on symmetric group can be performed by utilizing appropriate algebras of functions Thus the book explains how some Hopf algebras symmetric functions and generalizations can be used to encode most of the combinatorial properties of the representations of symmetric groups Overall the book is an innovative introduction to representation theory of symmetric groups for graduate students and researchers seeking new ways of thought **Advances in Noncommutative Geometry** Ali Chamseddine,Caterina Consani,Nigel Higson,Masoud Khalkhali,Henri Moscovici,Guoliang Yu,2020-01-13 This authoritative volume in honor of Alain Connes the foremost architect of Noncommutative Geometry presents the state of the art in the subject The book features an amalgam of invited survey and research papers that will no doubt be accessed read and referred to for several decades to come The pertinence and potency of new concepts and methods are concretely illustrated in each contribution Much of the content is a direct outgrowth of the Noncommutative Geometry conference held March 23 April 7 2017 in Shanghai China The conference covered the latest research and future areas of potential exploration surrounding topology and physics number theory as well as index theory and its ramifications in geometry Complex Geometry and Dynamics John Erik Fornæss,Marius Irgens,Erlend Fornæss Wold,2015-11-05 This book focuses on complex geometry and covers highly active topics centered around geometric problems in several complex variables and complex dynamics written by some of the world s leading experts in their respective fields This book features research and expository contributions from the 2013 Abel Symposium held at the Norwegian University of Science and Technology Trondheim on July 2 5 2013 The purpose of the symposium was to present the state of the art on the topics and to discuss future research directions *String-Math 2014* Vincent Bouchard:,Charles Doran,Stefan Méndez-Diez,Callum Quigley,2016-06-10 The conference String Math 2014 was held from June 9 13 2014 at the University of Alberta This edition of String Math is the first to include satellite workshops String Math Summer School held from June 2 6 2014 at the University of British Columbia Calabi Yau Manifolds and their Moduli held from June 14 18 2014 at the University of Alberta and Quantum Curves and Quantum Knot Invariants held from June 16 20 2014 at the Banff International Research Station This volume presents the

proceedings of the conference and satellite workshops For mathematics string theory has been a source of many significant inspirations ranging from Seiberg Witten theory in four manifolds to enumerative geometry and Gromov Witten theory in algebraic geometry to work on the Jones polynomial in knot theory to recent progress in the geometric Langlands program and the development of derived algebraic geometry and n category theory In the other direction mathematics has provided physicists with powerful tools ranging from powerful differential geometric techniques for solving or analyzing key partial differential equations to toric geometry to K theory and derived categories in D branes to the analysis of Calabi Yau manifolds and string compactifications to modular forms and other arithmetic techniques Articles in this book address many of these topics

The book delves into Graphs On Surfaces And Their Applications Encyclopaedia Of Mathematical Sciences. Graphs On Surfaces And Their Applications Encyclopaedia Of Mathematical Sciences is a crucial topic that needs to be grasped by everyone, from students and scholars to the general public. This book will furnish comprehensive and in-depth insights into Graphs On Surfaces And Their Applications Encyclopaedia Of Mathematical Sciences, encompassing both the fundamentals and more intricate discussions.

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