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The Hyperbolization Theorem for Fibered 3-Manifolds

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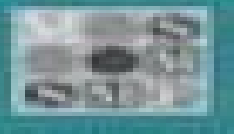

Hyperbolization Theorem For Fibered 3 Manifolds

Gilles Royer

Hyperbolization Theorem For Fibered 3 Manifolds:

The Hyperbolization Theorem for Fibered 3-Manifolds Jean-Pierre Otal,2001 For graduate students familiar with low dimensional topology and researchers in geometry and topology Otal CNRS UMR 128 Lyon offers a complete proof of Thurston s hyperbolization theorem for 3 manifolds that fiber as surface bundles The original Le Theoreme d Hyperbolisation pour les Varietes de Dimension 3 published by the French Mathematical Society in 1996 has been translated by Leslie D Kay c Book News Inc **The Millennium Prize Problems** James Carlson,Arthur Jaffe,Andrew Wiles,2023-09-14 On August 8 1900 at the second International Congress of Mathematicians in Paris David Hilbert delivered his famous lecture in which he described twenty three problems that were to play an influential role in mathematical research A century later on May 24 2000 at a meeting at the Coll ge de France the Clay Mathematics Institute CMI announced the creation of a US 7 million prize fund for the solution of seven important classic problems which have resisted solution The prize fund is divided equally among the seven problems There is no time limit for their solution The Millennium Prize Problems were selected by the founding Scientific Advisory Board of CMI Alain Connes Arthur Jaffe Andrew Wiles and Edward Witten after consulting with other leading mathematicians Their aim was somewhat different than that of Hilbert not to define new challenges but to record some of the most difficult issues with which mathematicians were struggling at the turn of the second millennium to recognize achievement in mathematics of historical dimension to elevate in the consciousness of the general public the fact that in mathematics the frontier is still open and abounds in important unsolved problems and to emphasize the importance of working towards a solution of the deepest most difficult problems The present volume sets forth the official description of each of the seven problems and the rules governing the prizes It also contains an essay by Jeremy Gray on the history of prize problems in mathematics **Collected Works of William P. Thurston with Commentary** Benson Farb,David Gabai,Steven P. Kerckhoff,2023-06-05 William Thurston s work has had a profound influence on mathematics He connected whole mathematical subjects in entirely new ways and changed the way mathematicians think about geometry topology foliations group theory dynamical systems and the way these areas interact His emphasis on understanding and imagination in mathematical learning and thinking are integral elements of his distinctive legacy This four part collection brings together in one place Thurston s major writings many of which are appearing in publication for the first time Volumes I III contain commentaries by the Editors Volume IV includes a preface by Steven P Kerckhoff Volume I contains William Thurston s papers on foliations mapping classes groups and differential geometry **Spaces of Kleinian Groups** Yair N. Minsky,Makoto Sakuma,Caroline Series,2006-06-19 The subject of Kleinian groups and hyperbolic 3 manifolds is currently undergoing explosively fast development the last few years having seen the resolution of many longstanding conjectures This volume contains important expositions and original work by some of the main contributors on topics such as topology and geometry of 3 manifolds curve complexes classical Ahlfors Bers theory computer explorations and projective structures

Researchers in these and related areas will find much of interest here **Geometric and Cohomological Methods in Group Theory** Martin R. Bridson,2009-10-29 An extended tour through a selection of the most important trends in modern geometric group theory Hyperbolic Manifolds and Discrete Groups Michael Kapovich,2009-08-04 The main goal of the book is to present a proof of the following Thurston s Hyperbolization Theorem The Big Monster Suppose that M is a compact atoroidal Haken 3 manifold that has zero Euler characteristic Then the interior of M admits a complete hyperbolic metric of finite volume This theorem establishes a strong link between the geometry and topology 3 of 3 manifolds and the algebra of discrete subgroups of Isom JH It completely changed the landscape of 3 dimensional topology and theory of Kleinian groups Further it allowed one to prove things that were beyond the reach of the standard 3 manifold technique as for example Smith s conjecture residual finiteness of the fundamental groups of Haken manifolds etc In this book we present a complete proof of the Hyperbolization Theorem in the generic case Initially we planned 1 including a detailed proof in the remaining case of manifolds fibered over as well However since Otal s book Ota96 which treats the fiber bundle case became available only a sketch of the proof in the fibered case will be given here *Thin Groups and Superstrong Approximation* Emmanuel Breuillard,Hee Oh,2014-02-17 This collection of survey articles focuses on recent developments at the boundary between geometry dynamical systems number theory and combinatorics **Ricci Flow and Geometric Applications** Michel Boileau,Gerard Besson,Carlo Sinestrari,Gang Tian,2016-09-09 Presenting some impressive recent achievements in differential geometry and topology this volume focuses on results obtained using techniques based on Ricci flow These ideas are at the core of the study of differentiable manifolds Several very important open problems and conjectures come from this area and the techniques described herein are used to face and solve some of them The book s four chapters are based on lectures given by leading researchers in the field of geometric analysis and low dimensional geometry topology respectively offering an introduction to the differentiable sphere theorem G Besson the geometrization of 3 manifolds M Boileau the singularities of 3 dimensional Ricci flows C Sinestrari and K hler Ricci flow G Tian The lectures will be particularly valuable to young researchers interested in differential manifolds **Algorithmic Topology and Classification of 3-Manifolds** Sergei Matveev,2013-04-17 The book is devoted to algorithmic low dimensional topology This branch of mathematics has recently been undergoing an intense development On the one hand the exponential advancement of computer technologies has made it possible to conduct sophisticated computer experiments and to implement algorithmic solutions which have in turn provided a motivation to search for new and better algorithms On the other hand low dimensional topology has received an additional boost because of the discovery of numerous connections with theoretical physics There is also another deep reason why algorithmic topology has received a lot of attention It is that a search for algorithmic solutions generally proves to be a rich source of well stated mathematical problems Speaking out of my experience it seems that an orientation towards how to rather than just how is serves as a probing stone for choosing among possible directions of research much like

problems in mechanics led once to the development of calculus *Handbook of Teichmüller Theory* Athanase Papadopoulos,2007 This multi volume set deals with Teichmuller theory in the broadest sense namely as the study of moduli space of geometric structures on surfaces with methods inspired or adapted from those of classical Teichmuller theory The aim is to give a complete panorama of this generalized Teichmuller theory and of its applications in various fields of mathematics The volumes consist of chapters each of which is dedicated to a specific topic The volume has 19 chapters and is divided into four parts The metric and the analytic theory uniformization Weil Petersson geometry holomorphic families of Riemann surfaces infinite dimensional Teichmuller spaces cohomology of moduli space and the intersection theory of moduli space The group theory quasi homomorphisms of mapping class groups measurable rigidity of mapping class groups applications to Lefschetz fibrations affine groups of flat surfaces braid groups and Artin groups Representation spaces and geometric structures trace coordinates invariant theory complex projective structures circle packings and moduli spaces of Lorentz manifolds homeomorphic to the product of a surface with the real line The Grothendieck Teichmuller theory dessins d enfants Grothendieck s reconstruction principle and the Teichmuller theory of the solenoid This handbook is an essential reference for graduate students and researchers interested in Teichmuller theory and its ramifications in particular for mathematicians working in topology geometry algebraic geometry dynamical systems and complex analysis The authors are leading experts in the field Hyperbolic Manifolds Albert Marden,2016-02-01 Over the past three decades there has been a total revolution in the classic branch of mathematics called 3 dimensional topology namely the discovery that most solid 3 dimensional shapes are hyperbolic 3 manifolds This book introduces and explains hyperbolic geometry and hyperbolic 3 and 2 dimensional manifolds in the first two chapters and then goes on to develop the subject The author discusses the profound discoveries of the astonishing features of these 3 manifolds helping the reader to understand them without going into long detailed formal proofs The book is heavily illustrated with pictures mostly in color that help explain the manifold properties described in the text Each chapter ends with a set of exercises and explorations that both challenge the reader to prove assertions made in the text and suggest further topics to explore that bring additional insight There is an extensive index and bibliography **Geometry and Dynamics of Groups and Spaces** Mikhail Kapranov,Sergii Kolyada,Yu. I. Manin,Pieter Moree,Leonid Potyagailo,2008-03-05 Alexander Reznikov 1960 2003 was a brilliant and highly original mathematician This book presents 18 articles by prominent mathematicians and is dedicated to his memory In addition it contains an influential so far unpublished manuscript by Reznikov of book length The book further provides an extensive survey on Kleinian groups in higher dimensions and some articles centering on Reznikov as a person Complex Dynamics and Geometry Dominique Cerveau,2003 In the last twenty years the theory of holomorphic dynamical systems has had a resurgence of activity particularly concerning the fine analysis of Julia sets associated with polynomials and rational maps in one complex variable At the same time closely related theories have had a similar rapid development for example the qualitative theory of

differential equations in the complex domain The meeting Etat de la recherche held at Ecole Normale Superieure de Lyon presented the current state of the art in this area emphasizing the unity linking the various sub domains This volume contains four survey articles corresponding to the talks presented at this meeting D Cerveau describes the structure of polynomial differential equations in the complex plane focusing on the local analysis in neighborhoods of singular points E Ghys surveys the theory of laminations by Riemann surfaces which occur in many dynamical or geometrical situations N Sibony describes the present state of the generalization of the Fatou Julia theory for polynomial or rational maps in two or more complex dimensions Lastly the talk by J C Yoccoz written by M Flexor considers polynomials of degree 2 in one complex variable and in particular with the hyperbolic properties of these polynomials centered around the Jakobson theorem This is a general introduction that gives a basic history of holomorphic dynamical systems demonstrating the numerous and fruitful interactions among the topics In the spirit of the Etat de la recherche de la SMF meetings the articles are written for a broad mathematical audience especially students or mathematicians working in different fields This book is translated from the French edition by Leslie Kay **Introduction to Hodge Theory** José Bertin,2002 Hodge theory originated as an application of harmonic theory to the study of the geometry of compact complex manifolds The ideas have proved to be quite powerful leading to fundamentally important results throughout algebraic geometry This book consists of expositions of various aspects of modern Hodge theory Its purpose is to provide the nonexpert reader with a precise idea of the current status of the subject The three chapters develop distinct but closely related subjects L 2 Hodge theory and vanishing theorems Frobenius and Hodge degeneration variations of Hodge structures and mirror symmetry The techniques employed cover a wide range of methods borrowed from the heart of mathematics elliptic PDE theory complex differential geometry algebraic geometry in characteristic p cohomological and sheaf theoretic methods deformation theory of complex varieties Calabi Yau manifolds singularity theory etc A special effort has been made to approach the various themes from their most natural starting points Each of the three chapters is supplemented with a detailed introduction and numerous references The reader will find precise statements of quite a number of open problems that have been the subject of active research in recent years The reader should have some familiarity with differential and algebraic geometry with other prerequisites varying by chapter The book is suitable as an accompaniment to a second course in algebraic geometry **An Initiation to Logarithmic Sobolev Inequalities** Gilles Royer,2007 This book provides an introduction to logarithmic Sobolev inequalities with some important applications to mathematical statistical physics Royer begins by gathering and reviewing the necessary background material on selfadjoint operators semigroups Kolmogorov diffusion processes solutions of stochastic differential equations and certain other related topics There then is a chapter on log Sobolev inequalities with an application to a strong ergodicity theorem for Kolmogorov diffusion processes The remaining two chapters consider the general setting for Gibbs measures including existence and uniqueness issues the Ising model with real spins and the application of log Sobolev

inequalities to show the stabilization of the Glauber Langevin dynamic stochastic models for the Ising model with real spins The exercises and complements extend the material in the main text to related areas such as Markov chains Information for our distributors Titles in this series are co published with Societe Mathematique de France SMF members are entitled to AMS member discounts **Asymptotically Symmetric Einstein Metrics** Olivier Biquard,2006 The correspondence between Einstein metrics and their conformal boundaries has recently been the focus of great interest This is particularly so in view of the relation with the physical theory of the AdS CFT correspondence In this book this correspondence is seen in the wider context of asymptotically symmetric Einstein metrics that is Einstein metrics whose curvature is asymptotic to that of a rank one symmetric space There is an emphasis on the correspondence between Einstein metrics and geometric structures on their boundary at infinity conformal structures CR structures and quaternionic contact structures introduced and studied in the book Two new constructions of such Einstein metrics are given using two different kinds of techniques analytic methods to construct complete Einstein metrics with a unified treatment of all rank one symmetric spaces relying on harmonic analysis algebraic methods twistor theory to construct local solutions of the Einstein equation near the boundary

Hamiltonian Systems and Their Integrability Mich'le Audin,2008 Hamiltonian systems began as a mathematical approach to the study of mechanical systems As the theory developed it became clear that the systems that had a sufficient number of conserved quantities enjoyed certain remarkable properties These are the completely integrable systems In time a rich interplay arose between integrable systems and other areas of mathematics particularly topology geometry and group theory This book presents some modern techniques in the theory of integrable systems viewed as variations on the theme of action angle coordinates These techniques include analytical methods coming from the Galois theory of differential equations as well as more classical algebro geometric methods related to Lax equations Audin has included many examples and exercises Most of the exercises build on the material in the text None of the important proofs have been relegated to the exercises Many of the examples are classical rather than abstract This book would be suitable for a graduate course in Hamiltonian systems **Outer Circles** A. Marden,2007-05-31 We live in a three dimensional space what sort of space is it Can we build it from simple geometric objects The answers to such questions have been found in the last 30 years and Outer Circles describes the basic mathematics needed for those answers as well as making clear the grand design of the subject of hyperbolic manifolds as a whole The purpose of Outer Circles is to provide an account of the contemporary theory accessible to those with minimal formal background in topology hyperbolic geometry and complex analysis The text explains what is needed and provides the expertise to use the primary tools to arrive at a thorough understanding of the big picture This picture is further filled out by numerous exercises and expositions at the ends of the chapters and is complemented by a profusion of high quality illustrations There is an extensive bibliography for further study **Foliations and the Geometry of 3-Manifolds** Danny Calegari,2007-05-17 This unique reference aimed at research topologists gives an exposition of the

pseudo Anosov theory of foliations of 3 manifolds This theory generalizes Thurston s theory of surface automorphisms and reveals an intimate connection between dynamics geometry and topology in 3 dimensions Significant themes returned to throughout the text include the importance of geometry especially the hyperbolic geometry of surfaces the importance of monotonicity especially in1 dimensional and co dimensional dynamics and combinatorial approximation using finite combinatorical objects such as train tracks branched surfaces and hierarchies to carry more complicated continuous objects

Trees of Hyperbolic Spaces Michael Kapovich,Pranab Sardar,2024-08-15 This book offers an alternative proof of the Bestvina Feighn combination theorem for trees of hyperbolic spaces and describes uniform quasigeodesics in such spaces As one of the applications of their description of uniform quasigeodesics the authors prove the existence of Cannon Thurston maps for inclusion maps of total spaces of subtrees of hyperbolic spaces and of relatively hyperbolic spaces They also analyze the structure of Cannon Thurston laminations in this setting Furthermore some group theoretic applications of these results are discussed This book also contains background material on coarse geometry and geometric group theory

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