



# The Geometric Topology of 3-Manifolds

R. H. Bing

# Geometric Topology Of 3 Manifolds

**William P. Thurston**



## **Geometric Topology Of 3 Manifolds:**

*The Geometric Topology of 3-manifolds* R. H. Bing, 1983-12-31 Suitable for students and researchers in topology this work provides the reader with an understanding of the physical properties of Euclidean 3 space the space in which we presume we live      **Handbook of Geometric Topology** R.B. Sher, R.J. Daverman, 2001-12-20 Geometric Topology is a foundational component of modern mathematics involving the study of spacial properties and invariants of familiar objects such as manifolds and complexes This volume which is intended both as an introduction to the subject and as a wide ranging resource for those already grounded in it consists of 21 expository surveys written by leading experts and covering active areas of current research They provide the reader with an up to date overview of this flourishing branch of mathematics

Geometric Topology in Dimensions 2 and 3 E.E. Moise, 2013-06-29 Geometric topology may roughly be described as the branch of the topology of manifolds which deals with questions of the existence of homeomorphisms Only in fairly recent years has this sort of topology achieved a sufficiently high development to be given a name but its beginnings are easy to identify The first classic result was the SchOnflies theorem 1910 which asserts that every 1 sphere in the plane is the boundary of a 2 cell In the next few decades the most notable affirmative results were the Schonflies theorem for polyhedral 2 spheres in space proved by J W Alexander and the triangulation theorem for 2 manifolds proved by T Rad6 Rd But the most striking results of the 1920s were negative In 1921 Louis Antoine A published an extraordinary paper in which he 4 showed that a variety of plausible conjectures in the topology of 3 space were false Thus a topological Cantor set in 3 space need not have a simply connected complement therefore a Cantor set can be imbedded in 3 space in at least two essentially different ways a topological 2 sphere in 3 space need not be the boundary of a 3 cell given two disjoint 2 spheres in 3 space there is not necessarily any third 2 sphere which separates them from one another in 3 space and so on and on The well known horned sphere of Alexander A appeared soon thereafter      **Geometric Topology** James C. Cantrell, 2014-05-10

Geometric Topology contains the proceedings of the 1977 Georgia Topology Conference held at the University of Georgia on August 1977 The book is comprised of contributions from leading experts in the field of geometric topology These contributions are grouped into four sections low dimensional manifolds topology of manifolds shape theory and infinite dimensional topology and miscellaneous problems Subjects discussed under these sections include local spanning missing loops the structure of generalized manifolds having nonmanifold set of trivial dimension universal open principal fibrations and how to build a flexible polyhedral surface Topologists geometers and mathematicians will find the book very interesting and insightful      **Algebraic and Geometric Topology, Part 2** R. James Milgram, American Mathematical Society, 1978

Contains sections on Structure of topological manifolds Low dimensional manifolds Geometry of differential manifolds and algebraic varieties H spaces loop spaces and CW complexes Problems      Selected Applications of Geometry to Low-Dimensional Topology Michael H. Freedman, Feng Luo, 1990 Based on lectures presented at Pennsylvania State

University in February 1987 this work begins with the notions of manifold and smooth structures and the Gauss Bonnet theorem and proceeds to the topology and geometry of foliated 3 manifolds It also explains why four dimensional space has special attributes

*The Geometry and Topology of Three-Manifolds* William P. Thurston, 2022-07-19 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 IV contains Thurston's highly influential though previously unpublished 1977 78 Princeton Course Notes on the Geometry and Topology of 3 manifolds It is an indispensable part of the Thurston collection but can also be used on its own as a textbook or for self study

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*Three-dimensional Geometry and Topology* William P. Thurston, 1997 Every mathematician should be acquainted with the basic facts about the geometry of surfaces of two dimensional manifolds The theory of three dimensional manifolds is much more difficult and still only partly understood although there is ample evidence that the theory of three dimensional manifolds is one of the most beautiful in the whole of mathematics This excellent introductory work makes this mathematical wonderland remained rather inaccessible to non specialists The author is both a leading researcher with a formidable geometric intuition and a gifted expositor His vivid descriptions of what it might be like to live in this or that three dimensional manifold bring the subject to life Like Poincaré he appeals to intuition but his enthusiasm is infectious and should make many converts for this kind of mathematics There are good pictures plenty of exercises and problems and the reader will find a selection of topics which are not found in the standard repertoire This book contains a great deal of interesting mathematics

*Algorithmic Topology and Classification of 3-Manifolds* Sergei Matveev, 2003-07-10 Here is a thorough review of topics in 3 dimensional topology derived from a decade

of courses taught by the author The author keeps the exposition to an elementary level by presenting the material mainly from the point of view of special polyhedra and special spines of 3 manifolds The book culminates with the recognition procedure for Haken manifolds and includes up to date results in computer enumeration of 3 manifolds The second edition adds new results new proofs and commentaries Algorithmic Topology and Classification of 3 Manifolds serves as a standard reference for algorithmic 3 dimensional topology for both graduate students and researchers *Introduction to 3-Manifolds* Jennifer Schultens, 2014-05-21 This book grew out of a graduate course on 3 manifolds and is intended for a mathematically experienced audience that is new to low dimensional topology The exposition begins with the definition of a manifold explores possible additional structures on manifolds discusses the classification of surfaces introduces key foundational results for 3 manifolds and provides an overview of knot theory It then continues with more specialized topics by briefly considering triangulations of 3 manifolds normal surface theory and Heegaard splittings The book finishes with a discussion of topics relevant to viewing 3 manifolds via the curve complex With about 250 figures and more than 200 exercises this book can serve as an excellent overview and starting point for the study of 3 manifolds **Lectures on the Topology of**

**3-Manifolds** Nikolai Saveliev, 2012-10-25 No detailed description available for Lectures on the Topology of 3 Manifolds

**An Introduction to Geometric Topology** Bruno Martelli, 2016 This book provides a self contained introduction to the topology and geometry of surfaces and three manifolds The main goal is to describe Thurston's geometrization of three manifolds proved by Perelman in 2002 The book is divided into three parts the first is devoted to hyperbolic geometry the second to surfaces and the third to three manifolds It contains complete proofs of Mostow's rigidity the thick thin decomposition Thurston's classification of the diffeomorphisms of surfaces via Bonahon's geodesic currents the prime and JSJ decomposition the topological and geometric classification of Seifert manifolds and Thurston's hyperbolic Dehn filling Theorem 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 *Collected Works of William P. Thurston with Commentary* Benson Farb, David Gabai, Steven P. Kerckhoff, 2022-07-19 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 II contains William Thurston's

papers on the geometry and topology of 3 manifolds on complexity constructions and computers and on geometric group theory

**The Arithmetic of Hyperbolic 3-Manifolds** Colin Maclachlan, Alan W. Reid, 2003 Recently there has been considerable interest in developing techniques based on number theory to attack problems of 3 manifolds Contains many examples and lots of problems Brings together much of the existing literature of Kleinian groups in a clear and concise way At present no such text exists

**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 in 1 dimensional and co dimensional dynamics and combinatorial approximation using finite combinatorial objects such as train tracks branched surfaces and hierarchies to carry more complicated continuous objects

Representing 3-manifolds By Filling Dehn Surfaces Ruben Vigara Benito, Alvaro Lozano-rojo, 2016-03-11 This book provides an introduction to the beautiful and deep subject of filling Dehn surfaces in the study of topological 3 manifolds This book presents for the first time in English and with all the details the results from the PhD thesis of the first author together with some more recent results in the subject It also presents some key ideas on how these techniques could be used on other subjects Representing 3 Manifolds by Filling Dehn Surfaces is mostly self contained requiring only basic knowledge on topology and homotopy theory The complete and detailed proofs are illustrated with a set of more than 600 spectacular pictures in the tradition of low dimensional topology books It is a basic reference for researchers in the area but it can also be used as an advanced textbook for graduate students or even for adventurous undergraduates in mathematics The book uses topological and combinatorial tools developed throughout the twentieth century making the volume a trip along the history of low dimensional topology

**Collected Works of William P. Thurston with Commentary** Benson Farb, David Gabai, Steven P. Kerckhoff, 2023-06-02 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 II contains William Thurston's papers on the geometry and topology of 3 manifolds on complexity constructions and computers and on geometric group theory

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