

Contents

	Editors' Preface	v
	Addresses of Authors	vii
I	Geometric Aspects of Two-Dimensional Complexes	1
	<i>Cynthia Hog-Angeloni and Wolfgang Metzler</i>	
1	Complexes of Low Dimensions and Group Presentations	1
2	Simple-Homotopy and Low Dimensions	11
3	P.L. Embeddings of 2-Complexes into Manifolds	29
4	Three Conjectures and Further Problems	44
II	Algebraic Topology for Two Dimensional Complexes	51
	<i>Allan J. Sieradski</i>	
1	Techniques in Homotopy	51
2	Homotopy Groups for 2-Complexes	62
3	Equivariant World for 2-Complexes	75
4	Mac Lane-Whitehead Algebraic Types	88
III	Homotopy and Homology Classification of 2-Complexes	97
	<i>M. Paul Latiolais</i>	
1	Bias Invariant & Homology Classification	97
2	Classifications for Finite Abelian π_1	111
3	Classifications for Non-Finite π_1 (with Cynthia Hog-Angeloni)	117

IV	Crossed Modules and Π_2 Homotopy Modules	125
	<i>Micheal N. Dyer</i>	
1	Introduction	125
2	Crossed and Precrossed Modules	126
3	On the Second Homotopy Module of a 2-Complex	140
4	Identity Properties	148
V	Calculating Generators of Π_2	157
	<i>William A. Bogley and Steve J. Pride</i>	
1	The Theory of Pictures	157
2	Generation of Π_2	167
3	Applications and Results	176
VI	Applications of Diagrams to Decision Problems	189
	<i>Günther Huck and Stephan Rosebrock</i>	
1	Introduction	189
2	Decidability and Dehn's Algorithm	190
3	Cayley Graph and van Kampen Diagrams	192
4	Word Hyperbolic Groups and Combings	197
5	Curvature Tests	203
VII	Fox Ideals, \mathcal{N}-Torsion and Applications to Groups and 3-Manifolds	219
	<i>Martin Lustig</i>	
1	Fox ideals	220
2	Applications of Fox ideals: Tests for the rank, the deficiency and the homological dimension of a group	225
3	\mathcal{N} -torsion: Basic theory	230

CONTENTS		vii
4	$\mathcal{N}^1(G)$, Nielsen equivalence of generating systems and Heegaard splittings	233
5	\mathcal{N} -torsion as generalization of the bias and (simple)-homotopy of (G, m) -complexes	245
VIII	(Singular) 3-Manifolds	251
	<i>Cynthia Hog-Angeloni and Allan J. Sieradski</i>	
1	3-Manifolds	251
2	Singular 3-Manifolds	274
IX	Cancellation Results for 2-Complexes and 4-Manifolds and Some Applications	281
	<i>Ian Hambleton and Matthias Kreck</i>	
1	A Cancellation Theorem for 2-Complexes	281
2	Stable Classification of 4-Manifolds	286
3	A Cancellation Theorem for Topological 4-Manifolds	290
4	A Homotopy Non-Cancellation Theorem for Smooth 4-Manifolds	296
5	A Non-Cancellation Example for Simple-Homotopy Equivalent Topological 4-Manifolds	299
6	Application of Cancellation to Exotic Structures on 4-Manifolds	302
7	Topological Embeddings of 2-Spheres into 1-Connected 4-Manifolds and Pseudo-free Group Actions	305
X	J. H. C. Whitehead's Asphericity Question	309
	<i>William A. Bogley</i>	
1	Introduction	309
2	The Context of Whitehead's Question	310
3	Structural Results	312
4	Reductions, Evidence and Test Cases	314

Cambridge University Press

0521447003 - Two-Dimensional Homotopy and Combinatorial Group Theory

Edited by Cynthia Hog-Angeloni, Wolfgang Metzler and Allan J. Sieradski

Table of Contents

[More information](#)

viii

CONTENTS

5	On the π_1 -Kernel	320
6	Acyclic Coverings	322
7	Finitely Generated Perfect Subgroups	326
8	Kaplansky's Theorem	328
9	Framed Links	330
10	Open Questions (with J. Howie)	333

XI Zeeman's Collapsing Conjecture 335

Sergei Matveev and Dale Rolfsen

1	Introduction	335
2	Collapsing	338
3	Some Special Ways of Collapsing $P^2 \times I$	339
4	1-Collapsibility Modulo 2-Expansions	348
5	Zeeman Conjecture for Special Polyhedra	349
6	Generalizing (Z) to Higher Dimensions	361
7	Open Problems	363

XII The Andrews-Curtis Conjecture and its Generalizations 365

Cynthia Hog-Angeloni and Wolfgang Metzler

1	Introduction	365
2	Strategies and Characterizations	366
3	Q^{**} -Transformations and Presentations of Free Products	373
4	Some Further Results	380

Bibliography 381

Index 408