## Contents

	Pref	ace	page 1x
1	<b>Intr</b> 1.1 1.2 1.3	oduction Introduction to Geometric Rigidity The Borel Conjecture Notes	1 1 4 8
2	Exa	10	
	2.1	Low-Dimensional Examples	10
	2.2	Constructions of Lattices	14
	2.3	Some More Exotic Aspherical Manifolds	20
	2.4	Notes	27
3	First Contact: the Proper Category		31
	3.1	Overview	31
	3.2	$K \setminus G\Gamma$ and Its Large-Scale Geometry	33
	3.3	Surgery	39
	3.4	Strong Approximation	45
	3.5	Property (T)	48
		Appendix: Property (T) and Expanders	53
	3.6	Cohomology of Lattices	56
	3.7	Mixing the Ingredients	65
	3.8	Morals	70
	3.9	Notes	71
4	How Can It Be True?		79
	4.1	Introduction	79
	4.2	The Hirzebruch Signature Theorem	81
	4.3	The Novikov Conjecture	84
	4.4	First Positive Results	85

Contents

	4.5	Novikov's Theorem	92
	4.6	Curvature, Tangentiality, and Controlled Topology	94
	4.7	Surgery, Revisited	99
	4.8	Controlled Topology, Revisited	106
	4.9	The Principle of Descent	110
	4.10	Secondary Invariants	114
	4.11	Notes	119
5	Playing the Novikov Game		
	5.1	Overview	129
	5.2	Anteing Up: Introduction to Index Theory	134
		Appendix: A Glimpse through the Looking Glass	139
	5.3	Playing the Game: What Happens in Particular Cases?	147
	5.4	The Moral	160
	5.5	Playing the Borel Game	163
	5.6	Notes	175
6	Equi	variant Borel Conjecture	186
	6.1	Motivation	186
	6.2	Trifles	189
	6.3	h-Cobordisms	199
	6.4	Cappell's UNil Groups	202
	6.5	The Simplest Nontrivial Examples	206
	6.6	Generalities about Stratified Spaces	212
	6.7	The Equivariant Novikov Conjecture	220
	6.8	The Farrell–Jones Conjecture	232
	6.9	Connection to Embedding Theory	235
	6.10	Embedding Theory	242
	6.11	Notes	249
7	Exist	tential Problems	258
	7.1	Some Questions	258
	7.2	The "Wall Conjecture" and Variants	261
	7.3	The Nielsen Problem and the Conner–Raymond Conjecture	267
	7.4	Products: On the Difference that a Group Action Makes	272
	7.5	Fibering	277
	7.6	Manifolds with Excessive Symmetry	283
	7.7	Notes	286
8	Epilo	ogue: A Survey of Some Techniques	291
	8.1	Codimension-1 Methods	291
	8.2	Induction and Control	294

8.3	Dynamics and Foliated Control	296
8.4	Tensor Square Trick	300
8.5	The Baum-Connes Conjecture	302
8.6	A-T-menability, Uniform Embeddability, and Expanders	306
References		311
Subject Index		340