
CONTENTS

PREFACE	ix
ACKNOWLEDGMENTS	xiii

Chapter 0 Background on Topological Groups and Lie Groups

1. Elementary Properties of Topological Groups	1
2. The Classical Groups	5
3. Integration on Compact Groups	11
4. Characteristic Functions on Compact Groups	15
5. Lie Groups	21
6. The Structure of Compact Lie Groups	26

Chapter I Transformation Groups

1. Group Actions	32
2. Equivariant Maps and Isotropy Groups	35
3. Orbits and Orbit Spaces	37
4. Homogeneous Spaces and Orbit Types	40
5. Fixed Points	44
6. Elementary Constructions.	46
7. Some Examples of $O(n)$ -Spaces	49
8. Two Further Examples	55
9. Covering Actions	62
Exercises for Chapter I	67

Chapter II General Theory of G -Spaces

1. Fiber Bundles	70
2. Twisted Products and Associated Bundles	72
3. Twisted Products with a Compact Group	79
4. Tubes and Slices	82
5. Existence of Tubes	84
6. Path Lifting	90

7. The Covering Homotopy Theorem	92
8. Conical Orbit Structures	98
9. Classification of G -Spaces	104
10. Linear Embedding of G -Spaces	110
Exercises for Chapter II	112

Chapter III Homological Theory of Finite Group Actions

1. Simplicial Actions	114
2. The Transfer	118
3. Transformations of Prime Period	122
4. Euler Characteristics and Ranks	126
5. Homology Spheres and Disks.	129
6. G -Coverings and Čech Theory	132
7. Finite Group Actions on General Spaces	141
8. Groups Acting Freely on Spheres	148
9. Newman's Theorem	154
10. Toral Actions	158
Exercises for Chapter III	166

Chapter IV Locally Smooth Actions on Manifolds

1. Locally Smooth Actions	170
2. Fixed Point Sets of Maps of Prime Period	175
3. Principal Orbits	179
4. The Manifold Part of M^*	186
5. Reduction to Finite Principal Isotropy Groups	190
6. Actions on S^n with One Orbit Type	196
7. Components of $B \cup E$	200
8. Actions with Orbits of Codimension 1 or 2	205
9. Actions on Tori	214
10. Finiteness of Number of Orbit Types	218
Exercises for Chapter IV	222

Chapter V Actions with Few Orbit Types

1. The Equivariant Collaring Theorem	224
2. The Complementary Dimension Theorem	230
3. Reduction of Structure Groups	233
4. The Straightening Lemma and the Tube Theorem	238
5. Classification of Actions with Two Orbit Types	246
6. The Second Classification Theorem	253
7. Classification of Self-Equivalences	261
8. Equivariant Plumbing	267

9. Actions on Brieskorn Varieties	272
10. Actions with Three Orbit Types	280
11. Knot Manifolds	287
Exercises for Chapter V	293

Chapter VI Smooth Actions

1. Functional Structures and Smooth Actions	296
2. Tubular Neighborhoods	303
3. Integration of Isotopies	312
4. Equivariant Smooth Embeddings and Approximations	314
5. Functional Structures on Certain Orbit Spaces	319
6. Special G -Manifolds	326
7. Smooth Knot Manifolds	333
8. Groups of Involutions	337
9. Semifree Circle Group Actions	347
10. Representations at Fixed Points	352
11. Refinements Using Real K -Theory	359
Exercises for Chapter VI	366

Chapter VII Cohomology Structure of Fixed Point Sets

1. Preliminaries	369
2. Some Inequalities	375
3. \mathbb{Z}_p -Actions on Projective Spaces	378
4. Some Examples	388
5. Circle Actions on Projective Spaces	393
6. Actions on Poincaré Duality Spaces	400
7. A Theorem on Involutions	405
8. Involutions on $S^n \times S^m$	410
9. \mathbb{Z}_p -Actions on $S^n \times S^m$	416
10. Circle Actions on a Product of Odd-Dimensional Spheres	422
11. An Application to Equivariant Maps	425
Exercises for Chapter VII	428

References

432

AUTHOR INDEX	454
SUBJECT INDEX	457