

Contents

Introduction	1
Notation	11
1 Stratified Spaces and Functional Structures	15
1.1 Decomposed spaces	15
1.2 Stratifications	22
1.3 Smooth Structures	26
1.4 Local Triviality and the Whitney conditions	34
1.5 The sheaf of Whitney functions	42
1.6 Rectifiable curves and regularity	44
1.7 Extension theory for Whitney functions on regular spaces	53
2 Differential Geometric Objects on Singular Spaces	63
2.1 Stratified tangent bundles and Whitney's condition (A)	63
2.2 Derivations and vector fields	65
2.3 Differential forms and stratified cotangent bundle	68
2.4 Metrics and length space structures	71
2.5 Differential operators	80
2.6 Poisson structures	83
3 Control Theory	91
3.1 Tubular neighborhoods	91
3.2 Cut point distance and maximal tubular neighborhoods	95
3.3 Curvature moderate submanifolds	101
3.4 Geometric implications of the Whitney conditions	112
3.5 Existence and uniqueness theorems	117
3.6 Tubes and control data	125
3.7 Controlled vector fields and integrability	134
3.8 Extension theorems on controlled spaces	140
3.9 Thom's first isotopy lemma	143
3.10 Cone spaces	147
4 Orbit Spaces	151
4.1 Differentiable G-Manifolds	151
4.2 Proper Group Actions	153

4.3	Stratification of the Orbit Space	158
4.4	Functional Structure	162
5	DeRham-Cohomology	169
5.1	The deRham complex on singular spaces	169
5.2	DeRham cohomology on C^∞ -cone spaces	171
5.3	DeRham theorems on orbit spaces	173
5.4	DeRham cohomology of Whitney functions	177
6	Homology of Algebras of Smooth Functions	183
6.1	Topological algebras and their modules	183
6.2	Homological algebra for topological modules	186
6.3	Continuous Hochschild homology	189
6.4	Hochschild homology of algebras of smooth functions	195
A	Supplements from linear algebra and functional analysis	201
A.1	The vector space distance	201
A.2	Polar decomposition	202
A.3	Topological tensor products	203
B	Kähler differentials	205
B.1	The space of Kähler differentials	205
B.2	Topological version	207
B.3	Application to locally ringed spaces	207
C	Jets, Whitney functions and a few C^∞-mappings	209
C.1	Fréchet topologies for C^∞ -functions	209
C.2	Jets	210
C.3	Whitney functions	211
C.4	Smoothing of the angle	212

Analytic and Geometric Study of Stratified Spaces

Contributions to Analytic and Geometric Aspects

Pflaum, M.J.

2001, X, 234 p., Softcover

ISBN: 978-3-540-42626-4