

Contents

1	Introduction and Equation-Solving Background	1
1.1 [1A]	The Classical Inverse Function Theorem	10
1.2 [1B]	The Classical Implicit Function Theorem	19
1.3 [1C]	Calmness	25
1.4 [1D]	Lipschitz Continuity	29
1.5 [1E]	Lipschitz Invertibility from Approximations	39
1.6 [1F]	Selections of Multi-Valued Inverses	51
1.7 [1G]	Selections from Nonstrict Differentiability	56
1.8 [1H]	An Implicit Function Theorem for Monotone Functions	61
1.9 [1I]	Commentary	65
2	Solution Mappings for Variational Problems	69
2.1 [2A]	Generalized Equations and Variational Problems	70
2.2 [2B]	Implicit Function Theorems for Generalized Equations	83
2.3 [2C]	Ample Parameterization and Parametric Robustness	94
2.4 [2D]	Semidifferentiable Functions	99
2.5 [2E]	Variational Inequalities with Polyhedral Convexity	106
2.6 [2F]	Variational Inequalities with Monotonicity	118
2.7 [2G]	Consequences for Optimization	123
2.8 [2H]	Commentary	141
3	Set-Valued Analysis of Solution Mappings	143
3.1 [3A]	Set Convergence	145
3.2 [3B]	Continuity of Set-Valued Mappings	154
3.3 [3C]	Lipschitz Continuity of Set-Valued Mappings	160
3.4 [3D]	Outer Lipschitz Continuity	167
3.5 [3E]	Aubin Property, Metric Regularity, and Linear Openness	172
3.6 [3F]	Implicit Mapping Theorems with Metric Regularity	183
3.7 [3G]	Strong Metric Regularity	192
3.8 [3H]	Calmness and Metric Subregularity	197

3.9 [3I]	Strong Metric Subregularity	201
3.10 [3J]	Commentary	212
4	Metric Regularity Through Generalized Derivatives	213
4.1 [4A]	Graphical Differentiation	213
4.2 [4B]	Graphical Derivative Criterion for Metric Regularity	221
4.3 [4C]	Coderivative Criterion for Metric Regularity	231
4.4 [4D]	Strict Derivative Criterion for Strong Metric Regularity	238
4.5 [4E]	Derivative Criterion for Strong Metric Subregularity	245
4.6 [4F]	Applications to Parameterized Constraint Systems	248
4.7 [4G]	Isolated Calmness for Variational Inequalities	253
4.8 [4H]	Variational Inequalities over Polyhedral Convex Sets	257
4.9 [4I]	Strong Metric Regularity of the KKT Mapping	265
4.10 [4J]	Commentary	276
5	Metric Regularity in Infinite Dimensions	277
5.1 [5A]	Positively Homogeneous Mappings	279
5.2 [5B]	Mappings with Closed Convex Graphs	286
5.3 [5C]	Sublinear Mappings	292
5.4 [5D]	The Theorems of Lyusternik and Graves	302
5.5 [5E]	Extending the Lyusternik–Graves Theorem	308
5.6 [5F]	Strong Metric Regularity and Implicit Functions	318
5.7 [5G]	Parametric Inverse Function Theorems	322
5.8 [5H]	Further Extensions in Metric Spaces.....	328
5.9 [5I]	Metric Regularity and Fixed Points	338
5.10 [5J]	The Bartle–Graves Theorem and Extensions.....	344
5.11 [5K]	Selections from Directional Differentiability.....	355
5.12 [5L]	Commentary	359
6	Applications in Numerical Variational Analysis.....	363
6.1 [6A]	Radius Theorems and Conditioning	364
6.2 [6B]	Constraints and Feasibility	373
6.3 [6C]	Iterative Processes for Generalized Equations	379
6.4 [6D]	Metric Regularity of Newton’s Iteration	388
6.5 [6E]	Inexact Newton’s Methods under Strong Metric Subregularity	402
6.6 [6F]	Nonsmooth Newton’s Method	411
6.7 [6G]	Uniform Strong Metric Regularity and Path-Following	425
6.8 [6H]	Galerkin’s Method for Quadratic Minimization.....	434
6.9 [6I]	Metric Regularity and Optimal Control	439
6.10 [6J]	The Linear-Quadratic Regulator Problem	443
6.11 [6K]	Commentary	454
	References.....	455
	Index	463