

Contents

<i>Preface</i>	<i>page</i>	ix
1 Morse theory		1
1.1 Introduction		1
1.2 Compactness conditions		9
1.3 Deformation lemmas		9
1.4 Critical groups		18
1.5 Minimizers		22
1.6 Nontrivial critical points		22
1.7 Mountain pass points		24
1.8 Three critical points theorem		24
1.9 Generalized local linking		25
1.10 p -Laplacian		25
2 Linking		30
2.1 Introduction		30
2.2 Minimax principle		30
2.3 Homotopical linking		31
2.4 Homological linking		33
2.5 Schechter and Tintarev's notion of linking		36
2.6 Pairs of critical points with nontrivial critical groups		40
2.7 Nonstandard geometries		42
3 Applications to semilinear problems		47
3.1 Introduction		47
3.2 Local nature of critical groups		48
3.3 Critical groups at zero		50

3.4	Asymptotically linear problems	57
3.5	Problems with concave nonlinearities	63
4	Fučík spectrum	67
4.1	Introduction	67
4.2	Examples	69
4.3	Preliminaries on operators	72
4.4	Variational formulation	74
4.5	Some estimates	75
4.6	Convexity and concavity	77
4.7	Minimal and maximal curves	78
4.8	Null manifold	93
4.9	Type II regions	100
4.10	Simple eigenvalues	101
4.11	Critical groups	101
5	Jumping nonlinearities	107
5.1	Introduction	107
5.2	Compactness	109
5.3	Critical groups at infinity	110
5.4	Solvability	115
5.5	Critical groups at zero	116
5.6	Nonlinearities crossing the Fučík spectrum	122
6	Sandwich pairs	125
6.1	Introduction	125
6.2	Flows	125
6.3	Cohomological index	126
6.4	Semilinear problems	131
6.5	p -Laplacian problems	133
6.6	Anisotropic systems	136
	Appendix Sobolev spaces	143
A.1	Sobolev inequality	143
A.2	Sobolev spaces	144
	<i>Bibliography</i>	147
	<i>Index</i>	156