

Contents

List of Figures	vii
Preface	ix
Introduction	1
Part 1. Maslov index in symplectic Banach spaces	9
Chapter 1. General theory of symplectic analysis in Banach spaces	11
1.1. Dual pairs and double annihilators	11
1.2. Basic symplectic concepts	14
1.3. Natural decomposition of X induced by a Fredholm pair of Lagrangian subspaces with vanishing index	21
1.4. Symplectic reduction of Fredholm pairs	23
Chapter 2. The Maslov index in strong symplectic Hilbert space	31
2.1. The Maslov index via unitary generators	31
2.2. The Maslov index in finite dimensions	32
2.3. Properties of the Maslov index in strong symplectic Hilbert space	33
Chapter 3. The Maslov index in Banach bundles over a closed interval	37
3.1. The Maslov index by symplectic reduction to a finite-dimensional subspace	37
3.2. Calculation of the Maslov index	41
3.3. Invariance of the Maslov index under symplectic operations	50
3.4. The Hörmander index	55
Part 2. Applications in global analysis	59
Chapter 4. The desuspension spectral flow formula	61
4.1. Short account of predecessor formulae	61
4.2. Spectral flow for closed self-adjoint Fredholm relations	66
4.3. Symplectic analysis of operators and relations	71
4.4. Proof of the abstract spectral flow formula	74
4.5. An application: A general desuspension formula for the spectral flow of families of elliptic boundary value problems	76
Appendix A. Perturbation of closed subspaces in Banach spaces	83
A.1. Some algebra facts	84

A.2. The gap topology	84
A.3. Continuity of operations of linear subspaces	86
A.4. Smooth family of closed subspaces in Banach spaces	92
A.5. Basic facts about symplectic Banach bundles	94
A.6. Embedding Banach spaces	95
A.7. Compact perturbations of closed subspaces	97
Bibliography	103
List of Symbols	109
Index of Names/Authors	113
Subject Index	115