

Topological Fixed Point Principles for Boundary Value Problems

by

Jan Andres and Lech Górniewicz

Kluwer Academic Publishers

to Helena and Maria

Table of Contents

Preface	ix
Scheme for the relationship of single sections	xiii
Chapter I	
Theoretical background	1
I.1. Structure of locally convex spaces	1
I.2. ANR-spaces and AR-spaces	16
I.3. Multivalued mappings and their selections	25
I.4. Admissible mappings	66
I.5. Special classes of admissible mappings	72
I.6. Lefschetz fixed point theorem for admissible mappings	88
I.7. Lefschetz fixed point theorem for condensing mappings	97
I.8. Fixed point index and topological degree for admissible maps in locally convex spaces	99
I.9. Noncompact case	106
I.10. Nielsen number	107
I.11. Nielsen number: noncompact case	120
I.12. Remarks and comments	123

Chapter II

General principles 127

II.1. Topological structure of fixed point sets: Aronszajn–Browder–Gupta-type results	127
II.2. Topological structure of fixed point sets: inverse limit method	131
II.3. Topological dimension of fixed point sets	136
II.4. Topological essentiality	138
II.5. Relative theories of Lefschetz and Nielsen	143
II.6. Periodic point principles	148
II.7. Fixed point index for condensing maps	160
II.8. Approximation methods in the fixed point theory of multivalued mappings	164
II.9. Topological degree defined by means of approximation methods	174
II.10. Continuation principles based on a fixed point index	184
II.11. Continuation principles based on a coincidence index	195
II.12. Remarks and comments	228

Chapter III

Application to differential equations and inclusions 233

III.1. Topological approach to differential equations and inclusions	233
III.2. Topological structure of solution sets: initial value problems	249
III.3. Topological structure of solution sets: boundary value problems	275
III.4. Poincaré operators	290

III.5. Existence results	306
III.6. Multiplicity results	350
III.7. Ważewski-type results	392
III.8. Bounding and guiding functions approach.....	421
III.9. Infinitely many subharmonics.....	496
III.10. Almost-periodic problems.....	534
III.11. Some further applications.....	557
III.12. Remarks and comments	590
 Appendices	
A.1. Almost-periodic single-valued and multivalued functions.....	599
A.2. Derivo-periodic single-valued and multivalued functions	657
A.3. Fractals and multivalued fractals.....	671
 References	697
 Index	755