

CONTENTS

Introduction	1
Chapter 1. Basic Notation and Background Definitions	8
A. Basic Notation	8
B. The Conley Index	10
C. Homology and Cohomology of Conley Indices	13
D. Sign Conventions for Products in Homology and Cohomology	15
Chapter 2. The Intersection Pairings L , $\mathfrak{L}$, and $\# \mathfrak{L}$	16
A. Pairs of Index Pairs Admissible for the Intersection Pairing	16
B. The Euclidean Case: the Homology Intersection Number Pairing L	17
C. The Manifold Case: the Intersection Class and Number Pairings $\mathfrak{L}$ and $\# \mathfrak{L}$	20
Chapter 3. Statement of the Continuation Results and Examples	31
A. Invariance of Intersection Numbers under Continuation	31
B. Continuation of $\mathfrak{L}$ over a Path of Isolated Invariant Sets	36
Chapter 4. Construction of Bilinear Pairings on Conley Indices	42
A. The Existence of Admissible Pairs of Index Pairs	42
B. Functorially Produced Pairings on the Conley Indices	47
C. The Proofs of Theorems 2.4 and 2.11	54
Chapter 5. Proofs of the Continuation Results	57
A. Maps between Conley Indices from Paths of Invariant Sets	57
B. The Proofs of Theorems 3.1, 3.2, 3.3, and 3.7	63
Chapter 6. Some Basic Computational Tools	73
A. Conditions on Singular Cycles for Computing $\mathfrak{L}$ and $\# \mathfrak{L}$	73
B. The Behavior of $\mathfrak{L}$ under Orbit Preserving Maps	82
Chapter 7. $\mathfrak{L}$ for Normally Hyperbolic Invariant Submanifolds	86
A. Summary of Results	86
B. Computational Preliminaries	89
C. Results Leading to the Proof of Theorem 7.5	103
D. Results Leading to the Proof of Theorem 7.6	109
Chapter 8. Products of Intersection Pairings	131
A. Preliminary Observations and Definitions	131
B. Conley Indices of Product Invariant Sets	132
C. A Kunneth Theorem for Conley Indices	133

D. Factor and Product Intersection Pairings	137
Chapter 9. The Cap Product Representation of $\mathfrak{L}$ and the Non-singularity of $\# \mathfrak{L}$	143
A. The Cap Product Representation and Corollaries	143
B. Some Technical Propositions on Poincaré Duality Isomorphisms and Čech Cap Products	145
C. Results Leading to the Proof of Theorem 9.4	147
D. The Case $S \cap \partial M \neq \emptyset$	165
Appendix A. Intersection Numbers and Existence Results for Two-Point Boundary Value Problems of Singularly Perturbed Systems	168
Appendix B. Proofs of the Propositions in §9.B	176
References	183