

Contents

Preface	vii
Chapter 1. Introduction	
 Kinds of Boundary Value Problems to Be Treated The Generalized Lipschitz Condition Herry Enjoyeness and Uniqueness Eail for Lipsch Roundary 	1
3. How Existence and Uniqueness Fail for Linear Boundary Value Problems	6
4. A Simple Nonlinear Boundary Value Problem	7
5. Standard Results concerning Initial Value Problems	10
Comments and Bibliography	14
Chapter 2. Relations between the First and Second Boundary Value Problems	
1. Relation between Uniqueness Intervals	17
2. Relation between Existence Intervals	18
Chapter 3. Picard's Iteration	
1. Introduction	21
2. Contraction Mappings	25

xii Contents

3. Boundary Value Problems	27
4. A More General Lipschitz Condition	34
5. An Improved Error Bound for the Picard Iterates	38
6. Extensions	42
Comments and Bibliography	47
Chapter 4. The Distance between Zeros and the Uniqueness Interval	
1. Introduction	50
2. The Connection between Uniqueness and the Zeros of	
Unforced Equations	52
3. Distance between Zeros for Unforced Equations	54
Comments and Bibliography	68
Chapter 5. Comparison Theorems	
	70
 Introduction Main Comparison Theorems 	70 72
2. Wall Comparison Theorems for Weak Differential Inequalities	80
Comments and Bibliography	85
Chapter 6. Principal Existence Theorems	
1. Introduction	88
2. Solutions of the Comparison Problems	89
3. Existence Theorems	93
Comments and Bibliography	99
Chapter 7. Further Existence and Uniqueness Results	
1. Introduction	103
2. Existence in the Nonsingular Case	104
3. Existence in the Singular Case	110
4. A General Uniqueness Theorem	112
5. Illustrative Examples	117
Comments and Bibliography	126

Contents	xiji
Chapter 8. Numerical Solution by Initial Value Methods	
1. Introduction	128
2. A Convergence Criterion	129
3. Lipschitzian Problems	131
Comments and Bibliography	139
Methods 1. Introduction	141
2. A Modified Picard Iteration	144
3. A Monotone Iteration	147
4. Newton's Method	153
5. Solution of Linear Problems by a Finite Difference Method	156
6. Some Illustrative Examples	159
Comments and Bibliography	165
Index	168

INDEX