

# Contents

<b>Preface</b> .....	vii
<b>Introduction</b> .....	1
<b>1. Preliminaries</b> .....	20
1.1 Semigroups and generators .....	20
1.2 Function spaces, elliptic operators, and maximal principles ....	30
Bibliographical Notes .....	34
<b>2. Existence and Compactness of Solution Semiflows</b> .....	36
2.1 Existence and compactness .....	36
2.2 Local existence and global continuation .....	46
2.3 Extensions to neutral partial functional differential equations ..	51
Bibliographical Notes .....	61
<b>3. Generators and Decomposition of State Spaces for Linear Systems</b> .....	65
3.1 Infinitesimal generators of solution semiflows of linear systems .....	65
3.2 Decomposition of state spaces by invariant subspaces .....	76
3.3 Computation of center, stable, and unstable subspaces .....	80
3.4 Extensions to equations with infinite delay .....	87
3.5 $L^2$ -stability and reduction of neutral equations .....	97
Bibliographical Notes .....	108
<b>4. Nonhomogeneous Systems and Linearized Stability</b> ...	111
4.1 Dual operators and an alternative theorem .....	111
4.2 Variation of constants formula .....	115
4.3 Existence of periodic or almost periodic solutions .....	120
4.4 Principle of linearized stability .....	123
4.5 Fundamental transformations and representations of solutions	127
Bibliographical Notes .....	141
<b>5. Invariant Manifolds of Nonlinear Systems</b> .....	143
5.1 Stable and unstable manifolds .....	143
5.2 Center manifolds .....	149
5.3 Flows on center manifolds .....	162
5.4 Global invariant manifolds of perturbed wave equations .....	167
Bibliographical Notes .....	180

<b>6. Hopf Bifurcations</b> .....	182
6.1 Some classical Hopf bifurcation theorems for ODEs .....	182
6.2 Smooth local Hopf bifurcations: a special case .....	186
6.3 Some examples from population dynamics .....	196
6.4 Smooth local Hopf bifurcations: general situations .....	204
6.5 A topological global Hopf bifurcation theory .....	214
6.6 Global continuation of wave solutions .....	222
Bibliographical Notes .....	241
<b>7. Small and Large Diffusivity</b> .....	244
7.1 Destablization of periodic solutions by small diffusivity .....	244
7.2 Large diffusivity under Neumann boundary conditions .....	262
Bibliographical Notes .....	266
<b>8. Invariance, Comparison, and Upper and Lower Solutions</b> .....	268
8.1 Invariance and inequalities .....	268
8.2 Systems and strict inequalities .....	280
8.3 Applications to reaction diffusion equations with delay .....	286
Bibliographical Notes .....	293
<b>9. Convergence, Monotonicity, and Contracting Rectangles</b> .....	295
9.1 Monotonicity and generic convergence .....	295
9.2 Stability and steady state solutions of quasimonotone systems .....	305
9.3 Comparison and convergence results .....	309
9.4 Applications to Lotka-Volterra competition models .....	315
Bibliographical Notes .....	321
<b>10. Dispativeness, Exponential Growth, and Invariance Principles</b> .....	323
10.1 Point dispativeness in a scalar equation .....	323
10.2 Convergence in a scalar equation .....	328
10.3 Exponential growth in a scalar equation .....	333
10.4 An invariance principle .....	342
Bibliographical Notes .....	347
<b>11. Traveling Wave Solutions</b> .....	349
11.1 Huxley nonlinearities and phase plane arguments .....	351
11.2 Delayed Fisher equation: sub-super solution method .....	363
11.3 Systems and monotone iteration method .....	371
11.4 Traveling oscillatory waves .....	382
Bibliographical Notes .....	395
<b>Bibliography</b> .....	400
<b>Index</b> .....	427