Contents

Preface to the first edition ix
Preface to the second edition xi

1 Introduction and overview 1
1.1 Some history 1
1.2 Examples of chaotic behavior 2
1.3 Dynamical systems 6
1.4 Attractors 10
1.5 Sensitive dependence on initial conditions 15
1.6 Delay coordinates 19
Problems 21
Notes 22

2 One-dimensional maps 24
2.1 Piecewise linear one-dimensional maps 24
2.2 The logistic map 32
2.3 General discussion of smooth one-dimensional maps 45
2.4 Examples of applications of one-dimensional maps to chaotic systems of higher dimensionality 57
Appendix: Some elementary definitions and theorems concerning sets 65
Problems 66
Notes 69

3 Strange attractors and fractal dimension 71
3.1 The box-counting dimension 71
Contents

10.4 Synchronization of chaotic systems 393
10.5 Stability of a chaotic set on an invariant manifold 402
10.6 Generalized synchronization of coupled chaotic systems 409
10.7 Phase synchronization of chaos 411
Problems 419
Notes 420

11 Quantum chaos 421
11.1 The energy level spectra of chaotic, bounded, time-independent systems 423
11.2 Wavefunctions for classically chaotic, bounded, time-independent systems 439
11.3 Temporally periodic systems 442
11.4 Quantum chaotic scattering 449
Problems 450
Notes 450

References 452
Index 475