Contents

Preface to the English Translation	iz
Introduction	1
Chapter 1. The Ergodic Hypothesis 1.1. Statistical Mechanics of Continuous Systems 1.2. Measure Preserving Transformations 1.3. Ergodicity 1.4. "Geometric" Interpretation of Ergodicity	7 9 10 12
Chapter 2. The Concept of Entropy 2.1. A Little Classical Thermodynamics: Clausius' Entropy 2.2. Entropy in Information Theory: Shannon's Entropy 2.3. Boltzmann's Entropy	15 15 17 21
Chapter 3. Entropy in Ergodic Theory 3.1. Physical Framework: Thermodynamics of Lattices 3.2. Entropy of an Invariant Measure 3.3. Topological Entropy and Pressure 3.4. Sub-shifts	25 25 27 30 32
Chapter 4. The Perron-Frobenius-Ruelle Theorem 4.1. Statement and Proof of the Theorem 4.2. Gibbs Measures and Equilibrium States 4.3. The Complex Ruelle Operator	35 35 40 44
Chapter 5. Conformal Repellers 5.1. Definition and General Properties 5.2. Examples 5.3. Calculation of the Hausdorff Dimension of J	47 47 49 52
Chapter 6. Iteration of Quadratic Polynomials 6.1. Fundamentals of Iteration 6.2. The Main Cardioid 6.3. Numerical Applications 6.4. Manning's Formula 6.5. Hausdorff Dimension of J_c for c in the Main Cardioid 6.6. The Hausdorff Dimension to Second Order Near 0	55 55 57 60 61 64 65
Chapter 7. Phase Transitions 7.1. Phase Transitions as Natural Phenomena 7.2. Theoretical Interpretation of Phase Transitions	69 69 71

viii CONTENTS

7.3. "Parabolic" Phase Transitions	72
Appendix A. Hausdorff Measures and Dimension	77
A.1. Standard Notions from Measure Theory	77
A.2. Hausdorff Measures	77
A.3. Hausdorff Dimension	78
Bibliography	81