

Contents

Volume II

<i>Preface</i>	<i>page</i> xvii
<i>Acknowledgments</i>	xxii
<i>Introduction</i>	xxiii

PART III TOPOLOGICAL DYNAMICS OF MEROMORPHIC FUNCTIONS

13 Fundamental Properties of Meromorphic Dynamical Systems	3
13.1 Basic Iteration of Meromorphic Functions	3
13.2 Classification of Periodic Fatou Components	13
13.3 The Singular Sets $\text{Sing}(f^{-n})$, Asymptotic Values, and Analytic Inverse Branches	34
14 Finer Properties of Fatou Components	67
14.1 Properties of Periodic Fatou Components	67
14.2 Simple Connectedness of Fatou Components	72
14.3 Baker Domains	75
14.4 Fatou Components of Class \mathcal{B} and \mathcal{S} of Meromor- phic Functions	77
15 Rationally Indifferent Periodic Points	85
15.1 Local and Asymptotic Behavior of Analytic Functions Locally Defined Around Rationally Indifferent Fixed Points	85
15.2 Leau–Fatou Flower Petals	104

15.3	Fatou Flower Theorem and Fundamental Domains Around Rationally Indifferent Periodic Points	110
15.4	Quantitative Behavior of Analytic Functions Locally Defined Around Rationally Indifferent Periodic Points: Conformal Measures Outlook	116
PART IV ELLIPTIC FUNCTIONS: CLASSICS, GEOMETRY, AND DYNAMICS		
16	Classics of Elliptic Functions: Selected Properties	125
16.1	Periods, Lattices, and Fundamental Regions	125
16.2	General Properties of Elliptic Functions	133
16.3	Weierstrass \wp -Functions I	140
16.4	The Field of Elliptic Functions	149
16.5	The Discriminant of a Cubic Polynomial	156
16.6	Weierstrass \wp -Functions II	166
17	Geometry and Dynamics of (All) Elliptic Functions	173
17.1	Forward and Inverse Images of Open Sets and Fatou Components	175
17.2	Fundamental Structure Results	182
17.3	Hausdorff Dimension of Julia Sets of (General) Elliptic Functions	187
17.4	Elliptic Function as a Member of $\mathcal{A}(X)$ for Forward Invariant Compact Sets $X \subseteq \mathbb{C}$	189
17.5	Radial Subsets of $J(f)$ and Various Dynamical Dimensions for Elliptic Functions $f: \mathbb{C} \rightarrow \widehat{\mathbb{C}}$	191
17.6	Sullivan Conformal Measures for Elliptic Functions	193
17.7	Hausdorff Dimension of Escaping Sets of Elliptic Functions	208
17.8	Conformal Measures of Escaping Sets of Elliptic Functions	214
PART V COMPACTLY NONRECURRENT ELLIPTIC FUNCTIONS: FIRST OUTLOOK		
18	Dynamics of Compactly Nonrecurrent Elliptic Functions	221
18.1	Fundamental Properties of Nonrecurrent Elliptic Functions: Mañé's Theorem	222

Contents of Volume II

ix

18.2	Compactly Nonrecurrent Elliptic Functions: Definition, Partial Order in $\text{Crit}_c(J(f))$, and Stratification of Closed Forward-Invariant Subsets of $J(f)$	242
18.3	Holomorphic Inverse Branches	248
18.4	Dynamically Distinguished Classes of Elliptic Functions	254
19	Various Examples of Compactly Nonrecurrent Elliptic Functions	263
19.1	The Dynamics of Weierstrass Elliptic Functions: Some Selected General Facts	263
19.2	The Dynamics of Square Weierstrass Elliptic Functions: Some Selected Facts	265
19.3	The Dynamics of Triangular Weierstrass Elliptic Functions: Some Selected Facts	269
19.4	Simple Examples of Dynamically Different Elliptic Functions	277
19.5	Expanding (Thus Compactly Nonrecurrent) Triangular Weierstrass Elliptic Functions with Nowhere Dense Connected Julia Sets	284
19.6	Triangular Weierstrass Elliptic Functions Whose Critical Values Are Preperiodic, Thus Being Subexpanding	288
19.7	Weierstrass Elliptic Functions Whose Critical Values Are Poles or Prepoles, Thus Being Subexpanding, Thus Compactly Nonrecurrent	291
19.8	Compactly Nonrecurrent Elliptic Functions with Critical Orbits Clustering at Infinity	295
19.9	Further Examples of Compactly Nonrecurrent Elliptic Functions	301
	PART VI COMPACTLY NONRECURRENT ELLIPTIC FUNCTIONS: FRACTAL GEOMETRY, STOCHASTIC PROPERTIES, AND RIGIDITY	
20	Sullivan h-Conformal Measures for Compactly Nonrecurrent Elliptic Functions	307
20.1	Existence of Conformal Measures for Compactly Nonrecurrent Elliptic Functions	308
20.2	Conformal Measures for Compactly Nonrecurrent Elliptic Functions and Holomorphic Inverse Branches	309

20.3	Conformal Measures for Compactly Nonrecurrent Regular Elliptic Functions: Atomlessness, Uniqueness, Ergodicity, and Conservativity	316
21	Hausdorff and Packing Measures of Compactly Nonrecurrent Regular Elliptic Functions	335
21.1	Hausdorff Measures	336
21.2	Packing Measure I	338
21.3	Packing Measure II	340
22	Conformal Invariant Measures for Compactly Nonrecurrent Regular Elliptic Functions	348
22.1	Conformal Invariant Measures for Compactly Nonrecurrent Regular Elliptic Functions: The Existence, Uniqueness, Ergodicity/Conservativity, and Points of Finite Condensation	349
22.2	Real Analyticity of the Radon–Nikodym Derivative $\frac{d\mu_h}{dm_h}$	360
22.3	Finite and Infinite Condensation of Parabolic Periodic Points with Respect to the Invariant Conformal Measure μ_h	367
22.4	Closed Invariant Subsets, $K(V)$ Sets, and Summability Properties	375
22.5	Normal Subexpanding Elliptic Functions of Finite Character: Stochastic Properties and Metric Entropy, Young Towers, and Nice Sets Techniques	393
22.6	Parabolic Elliptic Maps: Nice Sets, Graph Directed Markov Systems, Conformal and Invariant Measures, Metric Entropy	411
22.7	Parabolic Elliptic Maps with Finite Invariant Conformal Measures: Statistical Laws, Young Towers, and Nice Sets Techniques	428
22.8	Infinite Conformal Invariant Measures: Darling–Kac Theorem for Parabolic Elliptic Functions	445
23	Dynamical Rigidity of Compactly Nonrecurrent Regular Elliptic Functions	458
23.1	No Compactly Nonrecurrent Regular Function is Essentially Linear	459
23.2	Proof of the Rigidity Theorem	472

Contents of Volume II xi

<i>Appendix A</i> A Quick Review of Some Selected Facts from Complex Analysis of a One-Complex Variable	489
<i>Appendix B</i> Proof of the Sullivan Nonwandering Theorem for Speiser Class \mathcal{S}	494
<i>References</i>	503
<i>Index of Symbols</i>	510
<i>Subject Index</i>	513