

Contents

Preface	ix
1 Getting Acquainted	1
2 Complex Functions	13
2.1 Complex Numbers	14
2.2 Functions and Mappings	23
2.3 Arithmetic and Geometry	25
2.4 The Analytic Landscape	27
2.5 Color Representations	29
2.6 Convergence and Continuity	42
2.7 Some Plane Geometry	45
3 Analytic Functions	59
3.1 Polynomials and Rational Functions	60
3.2 Power Series	72
3.3 Introduction to Analytic Functions	94
3.4 Analytic Functions in Planar Domains	99
3.5 Analytic Functions on the Sphere	112
3.6 Analytic Continuation	117
4 Complex Calculus	133
4.1 Complex Differentiation	134
4.2 Complex Integration	150
4.3 Cauchy Integral Formula	169
4.4 Laurent Series and Singularities	175
4.5 Residues	183
4.6 Conjugate Harmonic Functions	191
5 Construction Principles	203
5.1 Function Sequences	203
5.2 Normal Families	206

5.3	Function Series	210
5.4	Infinite Products	219
5.5	Cauchy Integrals	227
5.6	Integrals with Parameters	241
6	Conformal Mappings	253
6.1	Mappings of Planar Domains	254
6.2	Special Conformal Mappings	259
6.3	Möbius Transformations	271
6.4	The Riemann Mapping Theorem	278
6.5	Boundary Correspondence	283
6.6	The Reflection Principle	289
6.7	Elliptic Integrals	295
6.8	The Schwarz-Christoffel Formula	302
7	Riemann Surfaces	311
7.1	Global Analytic Functions	312
7.2	Lifting Techniques	314
7.3	Typical Examples	317
7.4	Analytic Functions and Branch Points	322
7.5	Abstract Riemann Surfaces	330
7.6	Practical Excursion	337
	Epilogue	345
	Bibliography	347
	Index	352



<http://www.springer.com/978-3-0348-0179-9>

Visual Complex Functions

An Introduction with Phase Portraits

Wegert, E.

2012, XIV, 360 p. 231 illus., 202 illus. in color.,

Softcover

ISBN: 978-3-0348-0179-9

A product of Birkhäuser Basel