CONTENTS

TRANSLATOR'S PREFACE x
PREFACE xi

CHAPTER I

Certain Problems in the Theory of Continued Fractions

§ 1. Convergents 1
§ 2. Transformations of Continued Fractions 9
§ 3. The Transformation of Series into Continued Fractions 23
§ 4. General Considerations in the Convergence Theory of Continued Fractions 31
§ 5. Convergence Tests for Continued Fractions with Positive Coefficients 42
§ 6. Convergence Tests for Continued Fractions with Arbitrary Coefficients 46
§ 7. Convergence Tests for Continued Fractions which are Periodic in the Limit 58

CHAPTER II

Continued Fraction Expansions of Certain Functions

§ 1. A Solution of a Certain Riccati Equation with the help of Continued Fractions 76
§ 2. Continued Fraction Expansions of Binomial Functions 100
§ 3. The Continued Fraction Expansion of $\sqrt[x]{\bar{x}}$ 109
§ 4. Continued Fraction Expansions of the Natural Logarithm 110
§ 5. Continued Fraction Expansions of e^x 112

§ 6. Continued Fraction Expansions of the Inverse Trigonometric and Hyperbolic Functions 114
§ 7. Continued Fraction Expansions for tan x and tanh x . 122
§ 8. The Continued Fraction Expansion of the Integral $\int_0^x \frac{dx}{1+x^k}$ 125
§ 9. The Solution of the Equations of Boole and Riccati with the help of Continued Fractions 130
§ 10. Continued Fractions and the Hypergeometric Series . 133
§ 11. Continued Fraction Expansions of Prym's Function . 142
§ 12. The Continued Fraction Expansion of the Incomplete Gamma-Function 148

Chapter III

Further Methods for Obtaining Rational Function Approximations

§ 1. Obreschkoff's Formula 151
§ 2. The Derivation of Rational Function Approximations to Certain Functions with the Help of Obreschkoff's Formula 155
§ 3. The Solution of Certain Difference Equations with the Help of Continued Fractions 159
§ 4. The Derivation of Rational Function Approximations by means of Iteration 163
§ 5. Table of Approximate Values of e^x 165
§ 6. Table of Approximate Values of ln x 166
§ 7. Table of Approximate Values of tan x and tanh x . . 167
§ 8. Rational Function Approximations for sinh x and sin x 167
§ 9. Rational Function Approximations for cosh x and cos x 171
§ 10. Rational Function Approximations to the Error Function 174
§ 11. The Continued Fraction Expansion of Stirling's Series 175
§ 12. Rational Function Approximations for $\Gamma(1+x)$ . . . 177

Chapter IV

Generalized Continued Fractions

§ 1. The Computation of Square Roots with the Help of Matrices of the Second Order 182
§ 2. The Solution of Quadratic Equations with the Help of Matrices of the Second Order 188
§ 3. The Calculation of Cube Roots with the Help of Matrices 194
§ 4. The Calculation of Fourth Roots with the Help of Matrices 196
§ 5. The Calculation of Roots of Arbitrary Rational Order with the Help of a Matrix 198
§ 6. The Solution of Cubic Equations with the Help of Matrices 199
§ 7. The Solution of Equations of Higher Order with the Help of Matrices 201

Literature in the Russian Language on the General Theory of Continued Fractions 203
References 204
Supplementary References 210
Index 211