

# TABLE OF CONTENTS

Introduction . . . . .	1
1. Moment sequences and Hausdorff's theorems . . . . .	1
2. The linear functional determined by a moment sequence . . . . .	9
<b>Part One. EXTREMAL POLYNOMIALS OF FINITE FUNCTIONALS</b>	
<b>Chapter I. Segment-functionals on Polynomials . . . . .</b>	<b>14</b>
1. Extremal polynomials of a moment sequence . . . . .	14
2. Absolutely monotonic segments and their best extension . . . . .	21
3. The non-absolutely-monotonic segment and its extremal polynomials . . . . .	33
4. Čebyšev polynomials in the critical intervals . . . . .	39
<b>Chapter II. Properties of the Norm; Segments of the First and Second Classes . . . . .</b>	<b>49</b>
1. The norm as a function of the elements . . . . .	49
2. Segments of class I . . . . .	53
3. Faithful and fictitious distributions of a segment . . . . .	57
4. Some sufficient conditions for a segment to belong to class II . . . . .	60
5. Variable segment-functionals . . . . .	64
<b>Chapter III. Families of Extremal Polynomials . . . . .</b>	<b>69</b>
1. Construction of segments with given distribution . . . . .	69
2. Parametrization of families of polynomials . . . . .	72
3. Determined segment-functionals . . . . .	77
<b>Chapter IV. Polynomials of Passport <math>[n, n, 0]</math> . . . . .</b>	<b>81</b>
1. Determining segments for $[n, n, 0]$ polynomials . . . . .	81
2. Analytic construction of $[n, n, 0]$ polynomials . . . . .	91
3. Some metric properties of $[n, n, 0]$ polynomials . . . . .	99
<b>Chapter V. Polynomials of Passport <math>[n, n, 1]</math> . . . . .</b>	<b>103</b>
1. Existence and nature of deformation of $[n, n, 1]$ polynomials . . . . .	103
2. Methods of constructing $[n, n, 1]$ polynomials in the simplest cases . . . . .	107
3. General analytic construction of $[n, n, 1]$ polynomials . . . . .	112

Chapter VI. <b>Polynomials of Passport</b> $[n, n - 1, 0]$ . . . . .	117
1. Determining functional and qualitative investigation . . . . .	117
2. Equations of the boundary of the region $M$ . . . . .	123
3. Analytic construction of $[n, n - 1, 0]$ polynomials . . . . .	126
 Part Two. <b>PROBLEMS OF ČEBYŠEV APPROXIMATION</b>	
Chapter I. <b>Polynomials of Least Deviation for Some Classical Problems</b> . . . . .	133
1. V. A. Markov's problem . . . . .	133
2. The Zolotarev-Pšeborskiĭ problem . . . . .	137
3. N. I. Ahiezer's problem and its solution by the functional method . . . . .	143
Chapter II. <b>Best Uniform Approximation of Polynomials and Analytic Functions</b> . . . . .	146
1. Approximation of polynomials . . . . .	146
2. Approximation of analytic functions . . . . .	149
Chapter III. <b>The First Derivative Functional and A. A. Markov's Problem</b> . . . . .	156
1. Extremal polynomials of the derivative functional . . . . .	156
2. The norm of the derivative functional on $[0, 1]$ . . . . .	162
Chapter IV. <b>The Trigonometric Functionals <math>F_{\rho \cos}</math> and <math>F_{\rho \sin}</math> and Inequalities for Polynomials in the Complex Plane</b> . . . . .	168
1. Stability of trigonometric functionals . . . . .	168
2. Asymptotic behavior of the Zolotarev regions in the $z$ -plane . . .	171
Bibliography . . . . .	177
Appendix: <b>V. A. Gusev, Derivative Functionals of an Algebraic Polynomial and V. A. Markov's Theorem</b> . . . . .	179
Index of Numbered Examples . . . . .	199
Index of Numbered Theorems . . . . .	199
Subject Index . . . . .	201