

Contents

1 Basic Concepts	1
1.1 Simultaneous Methods for Finding Polynomial Zeros	1
1.2 Localization of Polynomial Zeros	26
1.3 Complex Interval Arithmetic	32
2 Iterative Processes and Point Estimation Theory	35
2.1 Newton's Method Estimates	35
2.2 Approximate Zeros of Quadratically Convergent Methods....	44
2.3 Approximate Zeros of Higher-Order Methods	48
2.4 Improvement of Smale's Result	51
2.5 Point Estimation of Durand–Kerner's Method.....	59
3 Point Estimation of Simultaneous Methods	67
3.1 Point Estimation and Polynomial Equations	67
3.2 Guaranteed Convergence: Correction Approach.....	71
3.3 Guaranteed Convergence: Sequence Approach	97
3.4 A Posteriori Error Bound Methods	118
4 Families of Simultaneous Methods of Higher Order:	
Part I	129
4.1 Hansen–Patrick's Family of Root Finding Methods	129
4.2 Derivative-Free Family of Simultaneous Methods	132
4.3 Family of Simultaneous Methods with Derivatives	146
4.4 Numerical Examples	156
5 Families of Simultaneous Methods of Higher Order:	
Part II	161
5.1 One-Parameter Family for Simple Zeros	161
5.2 Family of Methods with Corrections	174
5.3 Family of Interval Methods	186

References	197
Glossary	205
Index	207