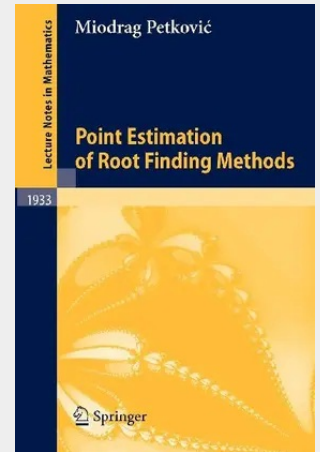


Point Estimation of Root Finding Methods

The problem of solving nonlinear equations and systems of equations ranks among the most significant in the theory and practice, not only of applied mathematics but also of many branches of engineering sciences, physics, computer science, astronomy, finance, and so on. A glance at the bibliography and the list of great mathematicians who have worked on this topic points to a high level of contemporary interest. Although the rapid development of digital computers led to the effective implementation of many numerical methods, in practical realization, it is necessary to solve various problems such as computational efficiency based on the total central processor unit time, the construction of iterative methods which possess a fast convergence in the presence of multiplicity (or clusters) of a desired solution, the control of rounding errors, information about error bounds of obtained approximate solution, stating computationally verifiable initial conditions that ensure a safe convergence, etc. It is the solution of these challenging problems that was the principal motivation for the present study. In this book, we are mainly concerned with the statement and study of initial conditions that provide the guaranteed convergence of an iterative method for solving equations of the form $f(z) = 0$. The traditional approach to this problem is mainly based on asymptotic convergence analysis using some strong hypotheses on differentiability and derivative bounds in a rather wide domain.

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