

Towards finding of the best methods for solving nonlinear equations

Changbum Chun
Sungkyunkwan University, Republic of Korea

Abstract The problem of solving a nonlinear equation is fundamental in science and engineering. There are many iterative algorithms for the solution of nonlinear equations, most of which introduce weight functions with a parameter to increase their order of convergence and enhance the behaviour of the iteration process. A natural yet fundamental question (goal) is: For a given algorithm, what is the value of the parameter that will give the best performer?

There are still very few ways in the literature to address this issue. In this talk, several efforts made to achieve this goal are introduced, including how to choose candidates of those parameter values, as well as how to directly determine the weight function itself that we hope will show the best performance. After the parameter selection process is done, the basin of attraction method, which measures the quality of a method, is employed to suggest the best methods.

Finally, our treatment of the question above is extended to constructing general families of methods for several topics, such as matrix sign function, a quasi-Newton methods for unconstrained optimization, and multiple roots equations.