EXPLORING THE EFFICACY OF MODIFIED NEWTON METHODS FOR NONLINEAR PROBLEM SOLVING: A COMPARATIVE STUDY

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ABSTRACT

This study investigates the efficacy of six modified Newton's methods for solving nonlinear equations: Weerakoon and Fernando method, midpoint Newton's method, Homeier method, fifth-order arithmetic mean Newton's method (FAN), fifth-order midpoint Newton's method (FMN), and fifth-order harmonic mean Newton's method (FHN). All of these methods will be evaluated and tested using eight distinct types of test functions and two different tolerances. The comparison of approaches is based on the amount of CPU time utilised, the accuracy of the results, and the number of iterations required. The study observed that the FMN method required fewer iterations due to its higher convergence rate, while the Homeier technique was more efficient in CPU time because it was simpler. Most of the methods in this study have similar accuracy. This study highlights the need of balancing iteration count and computing efficiency when selecting appropriate iterative algorithms for certain computational requirements.

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