AN IN-DEPTH COMPARATIVE ANALYSIS OF STEFFENSEN'S METHOD, MODIFIED STEFFENSEN'S METHOD AND NEWTON'S METHOD FOR EFFICIENT ROOT-FINDING

TASNIM ATIQAH BINTI AZIZ

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College of Computing, Informatics and Mathematics

Universiti Teknologi MARA

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ABSTRACT

This study presents a comparative analysis of numerical methods between Steffensen's method and Newton's method. This research proposed a new numerical method which is modified Steffensen's method. These methods are employed for solving nonlinear equations. All these methods will be compared and tested with seven different types of test functions and with differences initial guess and tolerance level using *Maple 2016* programming code. The performance of these methods was evaluated using performance profiles based on the number of iterations and CPU time. The results demonstrate that Newton's Method outperforms the other approaches, exhibiting the fastest convergence and the least computational cost. The findings underscore the significance of selecting appropriate numerical techniques to optimize computational efficiency, with potential applications across diverse scientific and engineering disciplines.

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