

UNIVERSITI TEKNOLOGI MARA

**THE COMBINATION OF MODIFIED
POTRA-PTAK AND CHEBYSHEV
METHODS IN SOLVING
NONLINEAR EQUATION**

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ABSTRACT

Nonlinear equations are extremely significant in numerous fields, such as science, mathematics, and engineering, and it is not always easy to determine their solution. Conventional approaches such as the Newton-Raphson method are also popular, although they sometimes fail when the initial guess is not close to the actual solution, but also when the function is very complicated. Due to this fact, faster, more accurate and reliable methods are required. The basic objective of the given research is to create the new combined technique which will unite the Modified Potra-Ptak method and the Chebyshev method to make the process of solving nonlinear equations more effective. The Potra-Ptak approach is popular due to its fast convergence and relatively low cost of calculation and Chebyshev method has higher accuracy and considers the second-derivative information. The Potra-Ptak method in this study is developed further and an extra step added to make a new three-step Modified Potra-Ptak formulation. Such an adapted approach is then used, together with the Chebyshev approach, in a predictor-corrector framework to enhance convergence rate and numerical stability. Maple 2023 compares the performance of the two methods combined and uses twelve forms of nonlinear test functions such as polynomials, logarithmic, exponential and trigonometric functions. The comparison was done in terms of accuracy, iterations and CPU time. The findings are hoped to demonstrate that the composite method performs better than the separate methods. Overall, this paper indicates that the suggested combination is a better, quicker, and more precise and dependable method of solving single-variable nonlinear equations, which will prove useful in future research in science and engineering.