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A NEW APPROACH OF ITERATIVE METHODS FOR SOLVING NON-LINEAR EQUATIONS USING BOOLE'S QUADRATURE

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Abstract: In this paper, we produced two efficient iterative methods improvising two earlier methods for solving non-linear equations using a quadrature of higher precision. The convergence analysis of the methods are studied. Using these new methods, some non-linear equations have been solved numerically. The results are found to be more encouraging as compared to those by using some earlier established methods.

Keywords and Phrases: Newton-Raphson method, Iterative method, Boole's rule, Convergence analysis, Modified super Halley method.

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1. Introduction

Detecting zeros of a single variable non-linear equation $f(x) = 0$ is always fascinating problem in numerical analysis. It has massive implementations in applied sciences. Researchers use iterative methods in solving non-linear equations. Taylor's rule, quadrature rules act as foundations in forming iterative methods.

In this paper, our intension is to design an efficient method of solution for a simple root of a non-linear equation $f(x) = 0$, where $f : I \subset R \to R$ defined on an open interval I.

We introduce Boole's quadrature rule [4].

$$\int_a^b f(x)dx = \frac{2h}{45}(7f_0 + 32f_1 + 12f_2 + 32f_3 + 7f_4) + E \tag{1.1}$$