NEW NEWTON-TYPE METHOD WITH $(k+2)$-ORDER CONVERGENCE FOR FINDING SIMPLE ROOT OF A POLYNOMIAL EQUATION

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ABSTRACT

The objective of this paper is to define a new Newton-type method for finding simple root of a polynomial. It is proved that the new one-point method has the convergence order of $(k+2)$ requiring n function evaluations per iteration, where k is the number of terms in the generating series. Kung and Traub conjectured that the multipoint iteration methods, without memory based on n evaluations, could achieve maximum convergence order 2^{n-1}, but the new method produces convergence order of $(k+2)$, which is better than the expected maximum convergence order of eight. Therefore, we show that the conjecture fails for a particular set of polynomial equations. We will demonstrate that the new method is very simple to construct.

Keywords: Newton-type method; Polynomial equation; Kung-Traub's conjecture; Efficiency index; Optimal order of convergence.

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