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NEW FIFTH-ORDER ITERATIVE METHOD FOR NONLINEAR ALGEBRAIC EQUATIONS

M. Javidi[1] and A. Yildirim[2]

[1]Department of Mathematics,
Faculty of science, Razi University, Kermanshah, 67149, Iran

[2]4146 Sk. No: 16 Zeytinalani Mah. Urla-Izmir-TURKEY

Abstract. In this paper, we present a new fifth-order iterative method for solving nonlinear algebraic equations by using modified homotopy perturbation method (HPM). We also discuss the convergence criteria of the present method. To assess its validity and accuracy, the method is applied to solve several test problems.

Keywords. Modified homotopy perturbation method; Nonlinear algebraic equations; Iterative methods

AMS (MOS) subject classification: 65H05

1 Introduction

Various problems arising in mathematical and engineering sciences can be formulated in terms of nonlinear equations of the form $f(x) = 0$. In the past decades, many modified iterative methods have been proposed to improve the order of convergence of some classical methods such as Newton, Halley or Ostrowskis methods [1-2]. In recent years, much attention have been given to develop and analyze a number of numerical methods for solving the nonlinear equations. In [3], the authors developed a four-parameter family of sixth order convergent iterative methods for solving nonlinear scalar equations. Khattri et al. [4] proposed a new two-parameter family of iterative methods for solving nonlinear scalar equations. Geum and Kim [5], developed a biparametric family of four-step multipoint iterative methods of order sixteen to solve nonlinear equations. The authors of [6], proposed a three-step iterative methods with eighth-order convergence for solving nonlinear equations. Noor in [7] proposed some iterative methods free from second derivatives for nonlinear equations. The authors of [8], proposed some iterative schemes for nonlinear equations. Noor et al. [9], proposed a new modified Halley method without second derivatives for nonlinear equation. A two-step derivative-free iterative algorithm is presented for solving nonlinear equations In [10]. Using the computer algebra system Mathematica, an iterative scheme and discuss the conditions to obtain fourth-order methods from it proposed In [11]. A new iteration scheme is proposed to solve the roots of an algebraic equation $f(x) = 0$ in [12].