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Title: Weerakoon-Fernando Method with accelerated third-order convergence for systems of nonlinear equations

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Abstract: Weerakoon-Fernando Method (WFM) is a widely accepted third order iterative method introduced in the late 1990s to solve nonlinear equations. Even though it has become so popular among numerical analysts resulting in hundreds of similar work for single variable case, after nearly two decades, nobody took the challenge of extending the method to multivariable systems. In this paper, we extend the WFM to functions of several variables and provide a rigorous proof for the third order convergence. This theory was supported by computational results using several systems of nonlinear equations. Computational algorithms were implemented using MATLAB. We further analyse the method mathematically and demonstrate the reason for the strong performance of WFM computationally, despite it requiring more function evaluations.

Keywords: functions of several variables; iterative methods; third order convergence; Weerakoon-Fernando Method; Newton's Method.

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