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Local convergence analysis of an eighth order scheme using hypothesis only on the first derivative. (English)  
Zbl 1461.65098  

Summary: In this paper, we propose a local convergence analysis of an eighth order three-step method to approximate a locally unique solution of a nonlinear equation in a Banach space setting. Further, we also study the dynamic behaviour of that scheme. In an earlier study, J. R. Sharma and H. Arora [Appl. Math. Lett. 29, 1–6 (2014; Zbl 1311.65051)] did not discuss these properties. Furthermore, the order of convergence was shown using Taylor series expansions and hypotheses up to the fourth order derivative or even higher of the function involved which restrict the applicability of the proposed scheme. However, only the first order derivatives appear in the proposed scheme. To overcome this problem, we present the hypotheses for the proposed scheme maximum up to first order derivative. In this way, we not only expand the applicability of the methods but also suggest convergence domain. Finally, a variety of concrete numerical examples are proposed where earlier studies can not be applied to obtain the solutions of nonlinear equations on the other hand our study does not exhibit this type of problem/restiction.

MSC: 65J15  
Numerical solutions to equations with nonlinear operators

Keywords:  
Kung-Traub method; local convergence; divided difference; Banach space; Lipschitz constant; radius of convergence

Full Text: DOI

References:

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