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Third-order iterative methods for operators with bounded second derivative. (English)

Authors’ summary: We analyze the classical third-order methods (Chebyshev, Halley, super-Halley) to solve a nonlinear equation \( F(x) = 0 \), where \( F \) is an operator defined between two Banach spaces. Until now the convergence of these methods is established assuming that the second derivative \( F'' \) satisfies a Lipschitz condition. In this paper we prove, by using recurrence relations, the convergence of these and other third-order methods just assuming \( F'' \) is bounded. We show examples where our conditions are fulfilled and the classical ones fail.

Reviewer: B. Döring (Düsseldorf)

MSC:
65J15 Numerical solutions to equations with nonlinear operators
47J25 Iterative procedures involving nonlinear operators

Keywords:
nonlinear operator equations; Chebyshev method; super-Halley method; third-order methods; Banach spaces; convergence; recurrence relations

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References:


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