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Efficient Ostrowski-like methods of optimal eighth and sixteenth order convergence and their dynamics. (English) Zbl 1438.65107 Afr. Mat. 30, No. 5-6, 921-941 (2019).

Summary: We present simple yet efficient three- and four-point iterative methods for solving nonlinear equations. The methodology is based on fourth order Ostrowski’s method and further developed by using inverse rational function approximation. Three-point method requires four function evaluations and has the order of convergence eight, whereas the four-point method requires the evaluation of five functions and has the order of convergence sixteen, that means, the methods are optimal in the sense of H. T. Kung and J. F. Traub [J. Assoc. Comput. Mach. 21, 643–651 (1974; Zbl 0289.65023)] hypothesis. The methods are tested through numerical experimentation. It is observed that new algorithms in general are more accurate than existing counterparts and very effective in high precision computations. Moreover, the presented basins of attraction also confirm stable nature of the algorithms as compared to existing ones.

MSC:

65H05 Numerical computation of solutions to single equations
41A20 Approximation by rational functions

Keywords: nonlinear equations; multipoint methods; order of convergence; computational efficiency; basins of attraction

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References:
