Efficient iterative methods with and without memory possessing high efficiency indices

ABSTRACT

Two families of derivative-free methods without memory for approximating a simple zero of a nonlinear equation are presented. The proposed schemes have an accelerator parameter with the property that it can increase the convergence rate without any new functional evaluations. In this way, we construct a method with memory that increases considerably efficiency index from $8^{1/4} \approx 1.681$ to $12^{1/4} \approx 1.861$. Numerical examples and comparison with the existing methods are included to confirm theoretical results and high computational efficiency.