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A non-iterative method for solving nonlinear equations

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Newton-Raphson method is the most commonly used iterative method for finding the root(s) of a real-valued function or nonlinear systems of equations. However, its convergence is often sensitive to the error in its initial estimation of the root(s). This talk will present a non-iterative method that mitigates non-convergence. An auxiliary initial-value problem of ordinary differential equation(s) is generated by a Computer Algebra System first, then integrated numerically over a closed interval. The solution(s) to the original systems of nonlinear equations is obtained non-iteratively at the end of the interval. A proof of the theorem serving as the base for this new method is presented at the talk. Several examples will illustrate its guaranteed convergence, a clear advantage over the Newton-Raphson method.

Keywords: Non-iterative method, Convergence, Nonlinear equations, Computer algebra

References

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