Abstract

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Galerkin Method for Nonlinear Higher-Order Boundary Value Problems Based on Chebyshev Polynomials

In the current paper, we develop an algorithm to approximate the analytic solution for the nonlinear boundary value problems in higher-order based on the Galerkin method. Chebyshev polynomials are introduced as bases of the solution. Meanwhile, some theorems are deducted to simplify the nonlinear algebraic set resulted from applying the Galerkin method, while Newton's method is used to solve the resulting nonlinear system. Numerous examples are presented to prove the usefulness and effectiveness of this algorithm in comparison with some other methods.