

QSSOR and cubic non-polynomial spline method for the solution of two-point boundary value problems

ABSTRACT

Two-point boundary value problems are commonly used as a numerical test in developing an efficient numerical method. Several researchers studied the application of a cubic non-polynomial spline method to solve the two-point boundary value problems. A preliminary study found that a cubic non-polynomial spline method is better than a standard finite difference method in terms of the accuracy of the solution. Therefore, this paper aims to examine the performance of a cubic non-polynomial spline method through the combination with the full-, half-, and quarter-sweep iterations. The performance was evaluated in terms of the number of iterations, the execution time and the maximum absolute error by varying the iterations from full-, half- to quarter-sweep. A successive over-relaxation iterative method was implemented to solve the large and sparse linear system. The numerical result showed that the newly derived QSSOR method, based on a cubic non-polynomial spline, performed better than the tested FSSOR and HSSOR methods.