

Quarter-sweep successive over-relaxation approximation to the solution of porous medium equations

ABSTRACT

This paper investigated the use of a successive over-relaxation parameter in a quarter-sweep finite difference approximation scheme. The performance of the developed quarter-sweep successive over-relaxation method is examined by considering a nonlinear partial differential equation, namely the porous medium equation. The main contribution of this paper is to present the stability, convergence and efficiency of the proposed method. Several initial-boundary value problems of the porous medium equation are solved to illustrate the efficiency of the proposed method. The numerical results showed that the quarter-sweep successive over-relaxation method is more efficient in reducing iterations and computational time than the standard and the existing numerical methods. In addition, the accuracy of the quarter-sweep successive over-relaxation method is comparable to the tested numerical methods.