

Implicit finite difference solution of 1D nonlinear porous medium equation via four-point EGSOR with newton iteration

ABSTRACT

Porous medium equation (PME) has a great practical in fluid flow, heat transfer and population dynamics. The nonlinearity in this equation makes it interesting in the development of nonlinear analytical and numerical tools in pure and applied mathematics and sciences. This paper proposes a Four-Point EGSOR with Newton iteration to solve the 1D PME problems. The reliability of proposed method is illustrated. The formulation and implementation of the proposed method are also presented. The numerical results showed that the Four-Point EGSOR with Newton iteration requires less number of iterations and computational time in obtaining the numerical solution to the 1D PME problems. With these results, it can be said that the Four-Point Newton-EGSOR iterative method can be a promising numerical method in tackling nonlinear differential equation problems. To enhance the rate of convergence of the current method, in future work, this study will investigate the application of MSOR as in Sulaiman et al. (2012).