The application of successive overrelaxation method for the solution of linearized half-sweep finite difference approximation to two-dimensional porous medium equation

ABSTRACT

Successive overrelaxation or S.O.R. method is a widely known parameter-based iterative method that can regulate a large and sparse system of equations so that the number of iterations required to solve the system can be reduced. Many researchers have applied the S.O.R. method to get the solution to the mathematical problem efficiently. This paper extends the application of the S.O.R. method to solve one of the nonlinear partial differential equation, which is the two-dimensional porous medium equation. The S.O.R. method is incorporated into an iterative method that is formulated based on a half-sweep finite difference approximation, and the Newton-type linearization solves the nonlinear term that presents in the equation. The numerical experiment that uses this innovative numerical method to solve several two-dimensional porous medium equation problems shows significant improvement to the percentage of reduction in the number of iterations and computation time.