

# **Numerical Solution of Nonlinear Diffusion in One Dimensional Porous Medium Using Hybrid SOR Method**

## **ABSTRACT**

This paper proposes a hybrid successive over-relaxation iterative method for the numerical solution of a nonlinear diffusion in a one-dimensional porous medium. The considered mathematical model is discretized using a computational complexity reduction scheme called half-sweep finite differences. The local truncation error and the analysis of the stability of the scheme are discussed. The proposed iterative method, which uses explicit group technique and modified successive over-relaxation, is formulated systematically. This method improves the efficiency of obtaining the solution in terms of total iterations and program elapsed time. The accuracy of the proposed method, which is measured using the magnitude of absolute errors, is promising. Numerical convergence tests of the proposed method are also provided. Some numerical experiments are delivered using initial-boundary value problems to show the superiority of the proposed method against some existing numerical methods.