

## **Application of newton and msor methods for solving 2d porous medium equations**

### **ABSTRACT**

Nonlinear partial differential equations, for instance, porous medium equations, can be difficult to be solved. In the certain degree when the exact solution of a particular nonlinear differential equation is unworkable, the numerical approach can be the tool for an efficient solver. The numerical solution is important for a further investigation, not only in developing a better numerical method but also in studying the related complex phenomena. This paper aims to propose a numerical method that combines Newton and MSOR (NMSOR) methods for the solution of two-dimensional porous medium equations (2D PME). Implicit finite difference scheme is used to discretize the main nonlinear differential equation to generate a system of nonlinear equations. The system of nonlinear equations is then solved using the NMSOR method. The efficiency of the method in solving the nonlinear system is studied along with the tested Newton- Gauss-Seidel (NGS) and Newton-SOR (NSOR) methods. The finding shows the superiority of the NMSOR method over the other two tested methods in terms of a total number of iterations and time taken to obtain the solution. All three methods have a good agreement in terms of accuracy.