

Numerical evaluation on the solution of the porous medium equation by 4-point newton-explicit group

ABSTRACT

The porous medium equation is known as one of the nonlinear partial differential equations that are used to describe many physical phenomena involving fluid flow, mass and heat transfer, and diffusion of gas particles. The solution to this equation is important to understand the phenomena better. With the numerical method and advanced computing tools nowadays, solving nonlinear partial differential equations like the porous medium equation has gained interest from several researchers. Motivated by numerous efforts in solving porous medium equations, we propose a 4-point Newton-Explicit Group method and evaluate its efficiency to solve the one dimensional problem of the porous medium equation. The formulation of the finite difference scheme, the derivation of the 4-point Newton-Explicit Group, and the numerical evaluation of the proposed method are presented. From the numerical study, we show that the 4-point Newton Explicit Group method has a promising improvement in terms of efficiency when compared to the Newton-Gauss-Seidel and the 2-point Newton-Explicit Group methods.