UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

SOLVING NEWELL-WHITEHEAD-SEGEL EQUATION BY USING SEMI ANALYTICAL ITERATIVE METHOD

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IN THE NAME OF ALLAH, THE BENEFICIENT, THE MERCIFUL.

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ABSTRACT

Newell-Whitehead-Segel equation (NWS) is nonlinear Partial Differential equation (PDE) and used in modelling various phenomena arising in fluid mechanics. Generally, the iteration method used to solve nonlinear problems. But, the convergence of iteration methods is very difficult to achieve. In recent years, different methods used to solve NWS equation such as Adomian Decomposition method (ADM), Homotopy Perturbation method (HPM), New Iterative method (NIM), and Laplace Adomian Decomposition method (LADM) but the calculation takes large memory in the computer and the solution is quite difficult. In this study, NWS equation will be solve by using Semi Analytical Iterative method (SAIM) since it's never been used to solve this problem and to determine accuracy and efficiency of the method when compared with exact solution and those obtained by other methods which are ADM, LADM, and NIM (Patade and Bhalekar, 2015). The result obtained is better accuracy compared to the existing methods. This indicates the efficiency of SAIM in solving NWS equation. In the future study, SAIM is accurate, useful, and reliable for solving the nonlinear problem since there is no need for calculating derivatives or multiple integral and less computational works is demanded by using SAIM.