UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

SOLVING VAN DER POL EQUATION USING BANACH CONTRACTION METHOD

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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ABSTRACT

The Van der Pol equation is a second-order nonlinear differential equation that can be found in a variety of domains such as electronics, biology, and physics. The equation describes the behaviour of a circuit that includes a nonlinear device known as a Van der Pol oscillator that shows limit cycle oscillations. The Modification of Variational Iteration Method (MVIM), He's Parameter-Expanding Methods (HPEM), Adomian's Decomposition Method (ADM), Iteration Perturbation Method (IPM), Modified Adomian Decomposition Method (MADM), Perturbation Method (PM), and there are variety method have been suggested in recent years to solve Van der Pol equation. Nonetheless, despite its ubiquitous use, the Van der Pol oscillator's behaviour remains poorly understood in many circumstances, posing several hurdles for academics. Then, BCM will be applied in this study to check its efficiency whether it can be a new method to solving the nonlinear Van der Pol equation. Four nonlinear Van der Pol equation cases were identified and in this report they were presented adequately. All cases demonstrated that, as the iteration is increasing, the solution will be leading to the close form of the exact solution using BCM. Then, the Van der Pol equations initial value problems are satisfied in solved using the BCM. Hence, this study illustrates that the BCM is more dependable and straightforward when dealing with nonlinear Van der Pol equation. In the future, researchers could do a study deeply on solving the nonlinear Van der Pol equation using BCM so that BCM can use spreadly.