

UNIVERSITI TEKNOLOGI MARA

**BANACH CONTRACTION METHOD
FOR SOLVING THE EPIDEMIC
MODEL WITH CONSTANT
VACCINATION (P04S23)**

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NADIRA BINTI AHMAZI &
RUWAIDAH BINTI KHAIRUDIN**

BSc

JANUARY 2024

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ABSTRACT

This research explores the application of the Banach Contraction Method (BCM) to solve the Susceptible-Infectious-Recovered (SIR) epidemic model with constant vaccination. The study aims to solve SIR model with vaccination using BCM and validate the efficiency by comparing its results with other numerical and analytical techniques, highlighting its simplicity and efficiency in addressing the nonlinear dynamics of the SIR model. The subsequent chapter conducts a comprehensive review of existing literature, providing a comprehensive overview of previous studies on infectious disease modeling, emphasizing the applications of power series equations and methods like BCM. It establishes the context for the current research and identifies gaps addressed through the proposed methodology. Detailing a six-step approach, the methodology applied in evaluating the SIR model with BCM is outlined. From problem identification to Maple software implementation, each step is meticulously described, setting the foundation for subsequent chapters. Presenting the outcomes of the research, the study discusses the application of BCM in solving the SIR model equations and compares its accuracy with the Runge-Kutta (RK4) method. Graphical comparisons and numerical analyses showcase the reliability of BCM, supported by Maximal Error Remainder (MER) results. This study summarizes the successful application of BCM in modeling infectious diseases, supported by comparisons with RK4 and Adomian Decomposition Method (ADM).

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