ABSTRAK

Penelitian ini bertujuan menganalisis kestabilan model epidemik SEITR (*Susceptible–Exposed–Infective–Treatment–Recovered*) dengan pengaruh vaksinasi. Faktor vaksinasi dimasukkan untuk menggambarkan proporsi individu baru yang telah divaksin sejak awal. Analisis dilakukan terhadap dua titik ekuilibrium, yaitu ekuilibrium bebas penyakit dan ekuilibrium endemik. Bilangan reproduksi dasar ($\Re_0$) ditentukan menggunakan metode Next Generation Matrix sebagai parameter penentu kestabilan sistem. Simulasi numerik dengan metode Runge–Kutta orde 4 mendukung hasil analisis teoritis, di mana peningkatan cakupan vaksinasi secara signifikan menurunkan jumlah individu terinfeksi. Penelitian ini menegaskan bahwa strategi vaksinasi merupakan langkah efektif dalam pengendalian penyebaran penyakit menular.

Kata kunci: *Model epidemik SEITR, vaksinasi, kestabilan bebas penyakit dan endemik, metode Runge–Kutta orde 4.*

ABSTRACT

This study aims to analyze the stability of the SEITR epidemic model (Susceptible-Exposed-Infective-Treatment-Recovered) with the influence of vaccination. The vaccination factor is included to describe the proportion of new individuals who have been vaccinated from the beginning. The analysis is carried out on two equilibrium points, namely the disease-free equilibrium and the endemic equilibrium. The basic reproduction number ($\mathcal{R}_0$) is determined using the Next Generation Matrix method as a parameter to determine system stability. Numerical simulations using the fourth-order Runge-Kutta method support the theoretical analysis results, where an increase in vaccination coverage significantly reduces the number of infected individuals. This study emphasizes that vaccination strategies are an effective step in controlling the spread of infectious diseases.

Keywords: *SEITR epidemic model, vaccination, disease-free and endemic stability, fourth-order Runge-Kutta method..*