

ABSTRAK

Model *Susceptible-Exposed-Infectious-Recovered* (SEIR) adalah model yang dibangun berdasarkan model *Susceptible-Infectious-Recovered* (SIR) dengan menambahkan kompartemen *Exposed* (E) yang menyatakan kelompok individu yang terinfeksi tetapi belum menginfeksi individu lain. Dalam tugas akhir ini dijelaskan penurunan model epidemi SEIR, kemudian diselesaikan untuk memperoleh solusi eksak dalam bentuk parametrik yang kemudian diaproksimasi untuk kasus periode awal. Dari hasil pencocokan model terhadap data diperoleh nilai-nilai parameter tingkat penyebaran (β), tingkat menginfeksi (σ), dan tingkat kesembuhan atau kematian (γ) pada kasus harian Covid-19 di Sumatera Barat dari tanggal 26 Maret 2020 sampai tanggal 24 April 2020. Selanjutnya diperoleh bahwa aproksimasi solusi eksak cukup baik dalam mendeskripsikan proporsi *susceptible*, *exposed*, *infectious*, dan *recovered* pada masa-masa awal kemunculan Covid-19 di Sumatera Barat. Kemudian juga diperoleh angka reproduksi dasar (\mathcal{R}_0) lebih dari satu, yang mengkonfirmasi bahwa Covid-19 di Sumatera Barat telah menyebar di masyarakat.

Kata kunci: *Solusi eksak, model SEIR, pencocokan data, bilangan reproduksi dasar*

ABSTRACT

The *Susceptible-Exposed-Infectious-Recovered* (SEIR) model is a model that is constructed based on the *Susceptible-Infectious-Recovered* (SIR) model by adding an *Exposed* (E) compartment which represents a group of individuals who are infected but have not infected other individuals. This final project describes the derivation of the SEIR epidemic model, then it is solved to obtain an exact solution in parametric form which is then approximated for the case of early period. From the results of fitting the model to the data, we obtain parameter values for the rate of spread (β), the rate of infection (σ), and the rate of recovery or death (γ) in daily cases of Covid-19 in West Sumatra from 26 March 2020 to 24 April 2020. Furthermore, it is found that the approximation of the exact solution is quite good in describing the proportion of *susceptible*, *exposed*, *infectious*, and *recovered* in the early period of the occurrence of Covid-19 in West Sumatra. In addition, it is also obtained that basic reproduction number (\mathcal{R}_0) is greater than 1, which confirms that Covid-19 in West Sumatra has spread in the population.

Keywords: *Exact solution, SEIR model, data fitting, basic reproduction number*