ANALISIS KESTABILAN MODIFIKASI MODEL SEIQR PENYEBARAN SARS-COV-2 DENGAN ADANYA MOBILITAS INTERNASIONAL DI INDONESIA

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ABSTRAK

Coronavirus Disease (COVID-19) merupakan virus yang disebabkan oleh *severe Acute Respiratory Syndrome Coronavirus-2* (SARS-CoV-2). Sejak Januari 2020 COVID-19 ditetapkan sebagai pandemi oleh WHO maka berbagai negara diseluruh dunia melakukan upaya pencegahan masuknya wabah COVID-19 ke negara masing-masing, termasuk Indonesia dengan upaya pembatasan mobilitas. Penelitian ini bertujuan untuk membangun modifikasi model SEIQR penyebaran SARS-CoV-2 di Indonesia dengan mempertimbangkan mobilitas internasional serta menganalisis kestabilan model tersebut. Simulasi numerik juga dilakukan untuk melihat hasil kestabilan model modifikasi SEIQR dengan menggunakan data suspek sebelum/sesudah vaksinasi. Hasil penelitian ini menunjukan bahwa modifikasi model memiliki dua titik kritis yaitu titik kritis bebas penyakit dan endemik penyakit, kedua titik tersebut stabil ketika kondisi ketidaksetaraan parameter berdasarkan kriteria Routh-Hurwitz terpenuhi. Simulasi numerik menunjukan proses infeksi suspek sebelum vaksinasi lebih lambat dibandingkan dengan infeksi individu sesudah vaksinasi. Dari hasil penelitian ini disimpulkan bahwa dengan adanya upaya pembatasan mobilitas internasional di Indonesia mampu mengurangi jumlah individu baru yang terpapar dan terinfeksi COVID-19 di Indonesia.

***Kata kunci*:** model modifikasi SEIQR, kestabilan, Mobilitas internasional di Indonesia, COVID-19

ANALYSIS OF THE STABILITY OF THE SEIQR MODIFICATION OF THE SPREAD OF SARS-COV-2 WITH INTERNATIONAL MOBILITY IN INDONESIA

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ABSTRACT

Coronavirus Disease (COVID-19) is a virus caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). Since January 2020, COVID-19 was declared a pandemic by WHO, various countries throughout the world have made efforts to prevent the entry of the COVID-19 outbreak into their respective countries, including Indonesia, by limiting mobility. This research aims to develop a modified SEIQR model for the spread of SARS-CoV-2 in Indonesia by considering international mobility and analyzing the stability of the model. Numerical simulations were also carried out to see the stability results of the SEIQR modification model using suspect data before/after vaccination. The results of this research show that the modified model has two critical points, namely disease-free and disease-endemic critical points, both points are stable when the parameter inequality conditions based on the Routh-Hurwitz criteria are met. Numerical simulations show that the process of suspected infection before vaccination is slower than individual infection after vaccination. From the results of this research, it is concluded that efforts to limit international mobility in Indonesia can reduce the number of new individuals exposed to and infected with COVID-19 in Indonesia.

Keywords: Modified SEIQR Model, Stability, International Mobility in Indonesia, COVID-19