ABSTRAK

Skripsi ini membahas tentang pemodelan matematis penyebaran virus SARS-COV2 yang sedang menjadi pandemi di berbagai negara. Salah satu varian virus SARS-COV2 menyebabkan penyakit *Coronavirus disease 2019* atau COVID-19. COVID-19 adalah penyakit kronis pada pernapasan atas manusia. Model matematika yang dibangun berupa model $SHEIQRD$, yaitu populasi rentan terpapar (S), populasi yang melakukan *stay at home* (H), populasi dalam masa inkubasi virus (E), populasi terinfeksi virus (I), populasi yang melakukan isolasi karena konfirmasi klinis (Q), populasi yang sembuh (R), dan populasi yang meninggal karena virus (D). Model tersebut disajikan dalam sistem persamaan diferensial biasa nonlinear dan penyelesaian numerisnya menggunakan metode Runge-Kutta orde empat. Dengan memperhatikan bilangan reproduksi dasar R_0, pandemi COVID-19 akan berakhir ketika $R_0 \leq 1$ dan tetap menjadi pandemi ketika $R_0 > 1$. Efisiensi dari setiap parameter kebijakan seperti laju *stay at home* dalam mengurangi laju pertumbuhan virus juga dianalisis dalam skripsi ini.

Kata kunci: *COVID-19, sistem persamaan diferensial, Runge-Kutta orde empat.*

ABSTRACT

This thesis discusses the mathematical modeling of the spread of the SARS-COV2 virus which is currently becoming a pandemic in various countries. A variant of the SARS-COV2 virus causes *Coronavirus disease 2019* or COVID-19. COVID-19 is a chronic disease of the upper respiratory tract of humans. The mathematical model that was built was in the form of $SHEIQRD$ model, namely the population susceptible to exposure (S), the population who stayed at home (H), the population during the virus incubation period (E), the virus infected population (I), the population that was isolated due to clinical confirmation (Q), the recovered population (R), and the population who died from the virus (D). The model is presented in a system of ordinary nonlinear differential equations and its numerical solution using the fourth order Runge-Kutta method. By paying attention to the basic reproduction number R_0, the COVID-19 pandemic will be finished when $R_0 \leq 1$ and will remain a pandemic when $R_0 > 1$. The efficiency of each policy parameter such as the rate of stay at home in reducing the virus growth rate is also analyzed in this thesis.

Keywords: *COVID-19, system of ordinary differential equations, fourth order Runge-Kutta.*