Lab 03

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Task 1

For the third lab we had 2 Tasks, from which the firs task was to use our previous calcualtions from the firs lab.

- *Estimate the parameters of the system using LSQ:*

I have calculated the LSQ with the same model we have used in the second lab, with pseudo-inverse. The simulated and plotted results are shown on *Figure 1*. The two outputs are alike, except the extremes.

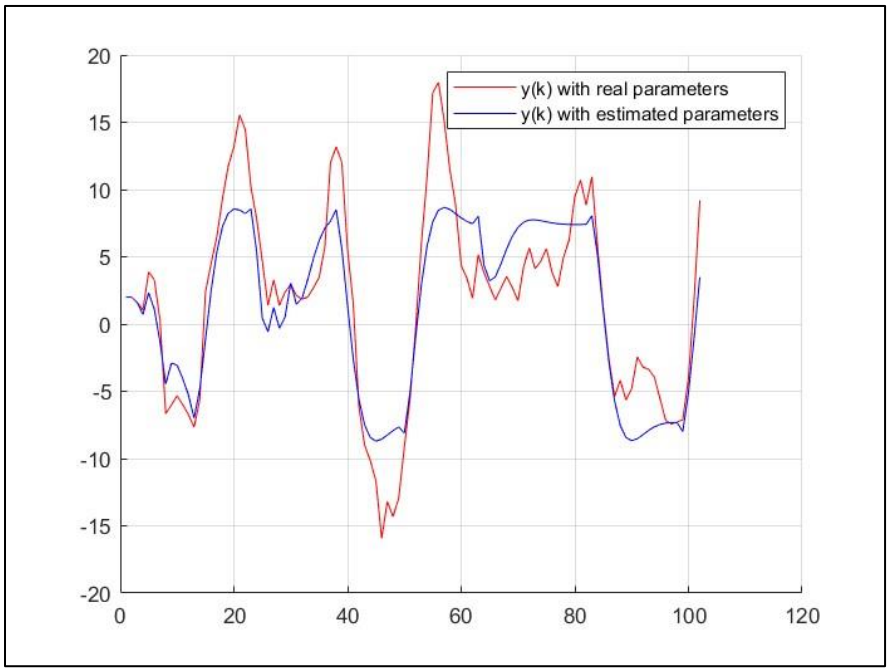

Figure 1 Plot of y(k) and y(k) with estimated parameters.

Task 2

For the second task we had to model a SIR (Susceptible-Infected-Recovered) model with three state variables and discretize the model using the Euler method. In the second exercise I have simulated the system using the given parameters with given initial values (*Figure 2*). With the same method I have used in the first task, I have calculated the parameters for the

inputs, outputs given in *sir.csv*. Before plotting I had to choose appropriate initial values for the system. For this I had tried with interpreted ranges, than chose the values by trial and error. For S(0), I knew it had to be around 1 (smaller than 1) and R(0) had to be zero because the calculation starts before the first impact of infecton. Than I chose the I(0) appropriatly to be 1 – S(0). The results are shown on *Figure 3*.

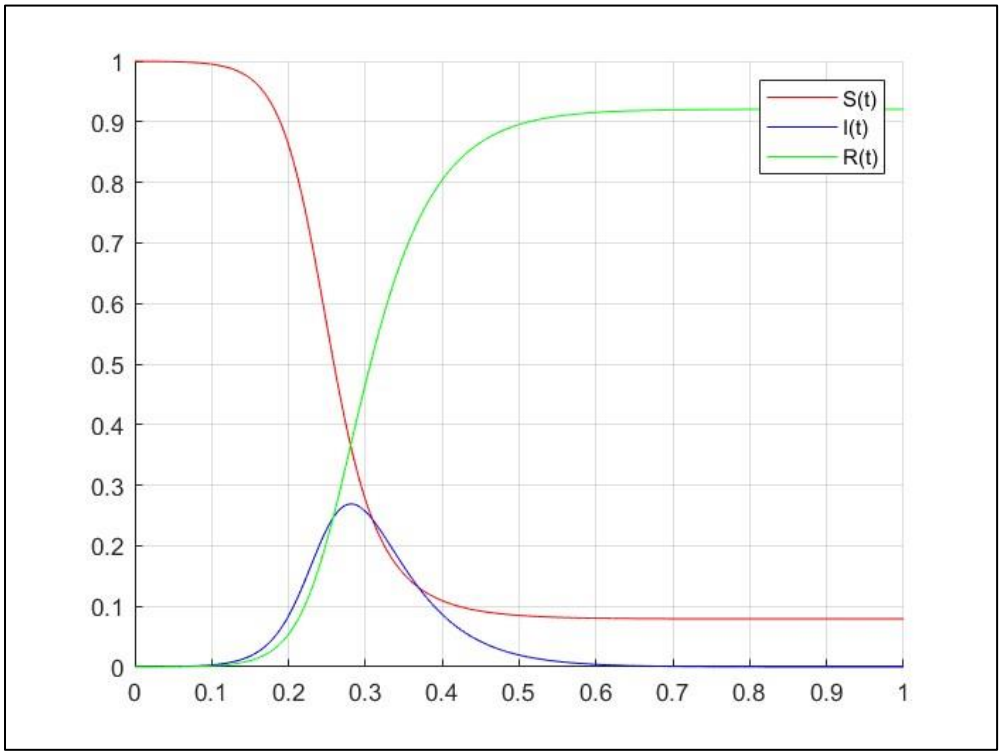

Figure 2 SIR model with given parameters and initial values.

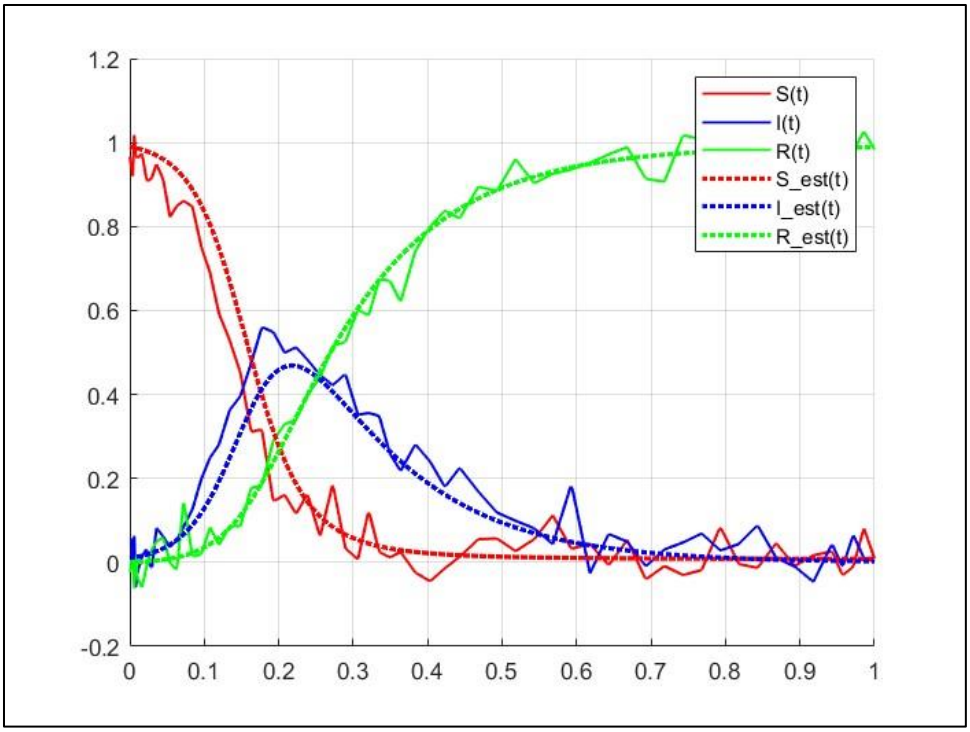

Figure 3 SIR model from sir.csv and SIR model with estimated parameters with dotted lines.