Task 1

Task 2

1 Writing Controller Code

This section blablabla

1.1 Level 1

The code equivalent to the Simulink block gave similar results which can be seen in Figure 1 and Figure 2. A sampling time of 10 ms was used for the code. Different sampling times were tested and it was noticed that when using a lower sampling time the impact on the trajectory planner increased. When a lower sampling time is used the change of acceleration is missed by a few milliseconds and therefore impact the velocity and position. This gives the difference in the position of the motor which is seen in Figure 2.

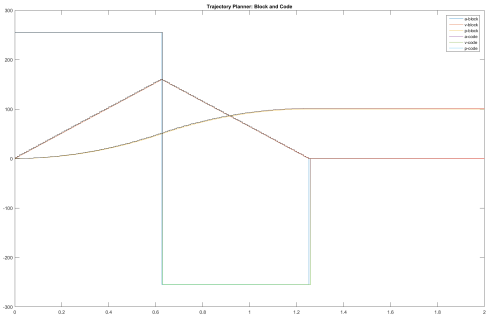

Figure 1: Trajectory planner signal comparison

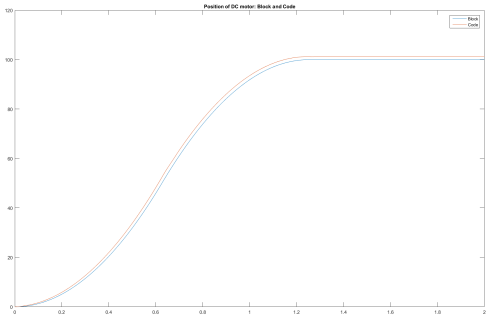

Figure 2: Motor position comparison

Task 3

Since the plant have a transfer function as,

$$G_o(s) = \frac{25.15}{s + 2.157} \tag{1}$$

and an $A_m(s)$ of same order should be choosen, the following functions is used,

$$A_m(s) = s + \omega_1$$
$$A_o(s) = s + \omega_2$$

with

$$\omega_1 = 10$$
$$\omega_2 = 5$$

These values gives the plot seen in figure 3

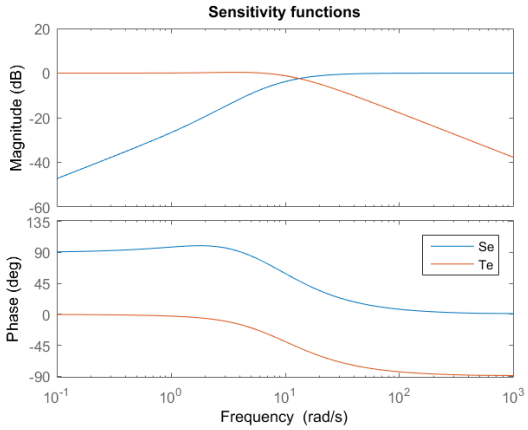

Figure 3: The sensitivity and conmplementary sensitivity function

when the poles for $A_0(s)$ is increased to five times $A_m(s)$ the results in figure 4 is obtained.

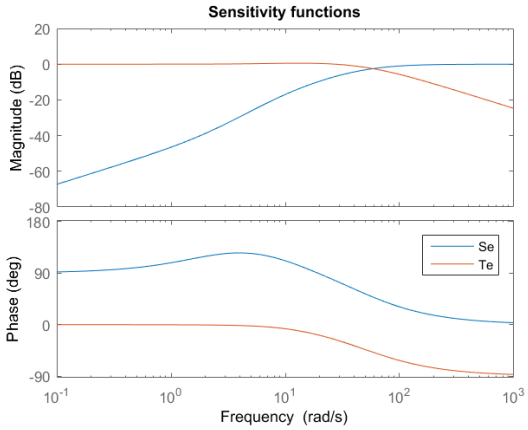

Figure 4: S_e and T_e with five times faster $A_o(s)$ poles

From the plots we can see that there is a possibility to adjust the system to be less sensitive to noice and disturbances from eather the sensor or the plant. This means that if there is a good plant model, there is moore room for sensornoice.