Problem 1d:

From the formula in 6.136 we get the desired formula if u_dot = 0 and delta^2 = 0

Problem 1e:

Yes, when no current or wind is present it reaches the desired speed. Varying wind can mess up the controller, but a constant noise should be compensated for in the controller so it should reach it either way.

Problem 1f:

Yes, for a setpoint change it should reduce the speed for a while since it changes direction since the speed now becomes in a different direction than the desired speed we would need to induce a Y-component to the velocity to turn before the desired speed is equal again.

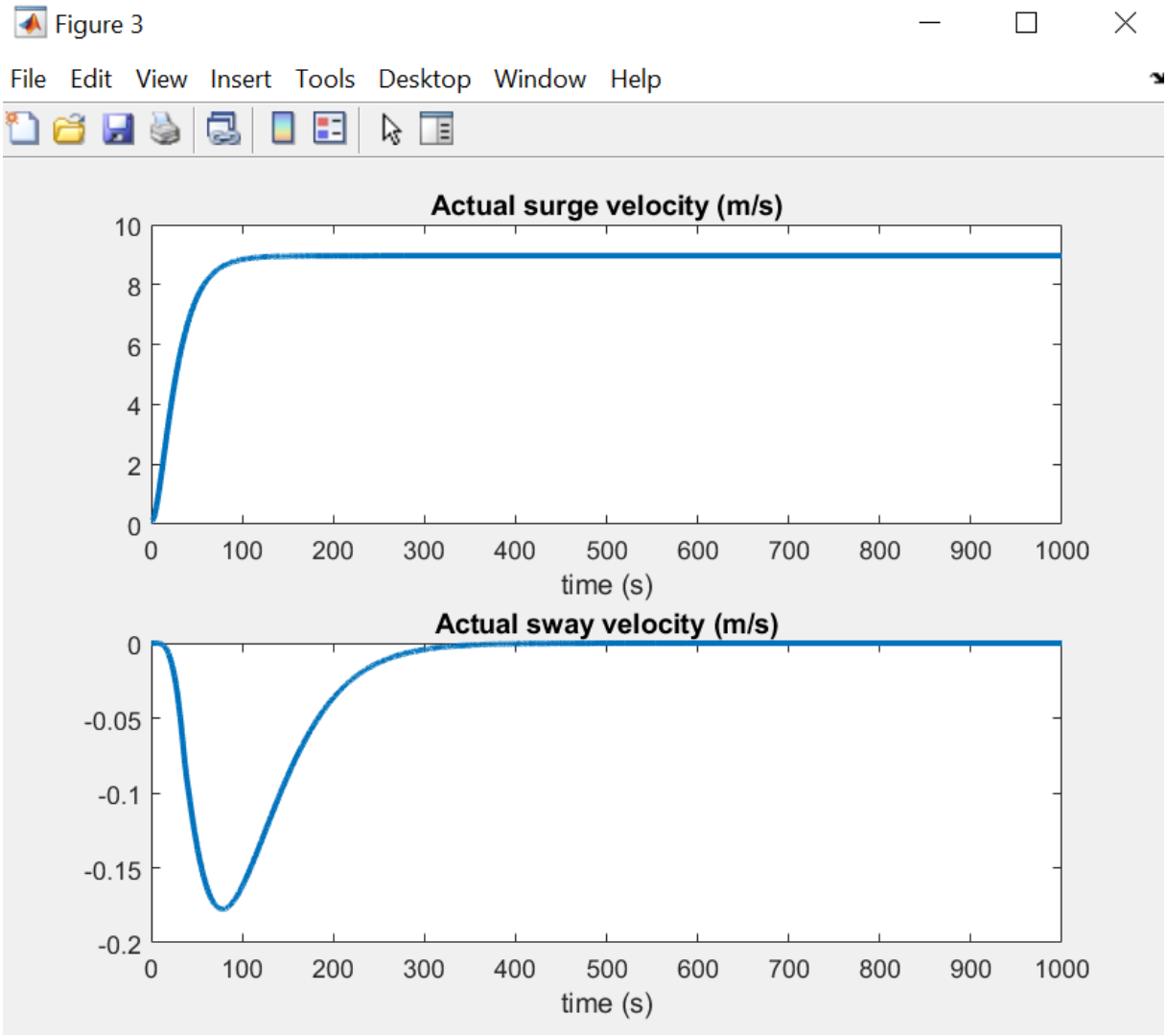
Figure 3
File Edit View Insert Tools Desktop Window Help
Actual surge velocity (m/s)
10
8
6
4
2
0
0 100 200 300 400 500 600 700 800 900 1000
time (s)
Actual sway velocity (m/s)
0
-0.05
-0.1
-0.15
-0.2
0 100 200 300 400 500 600 700 800 900 1000
time (s)

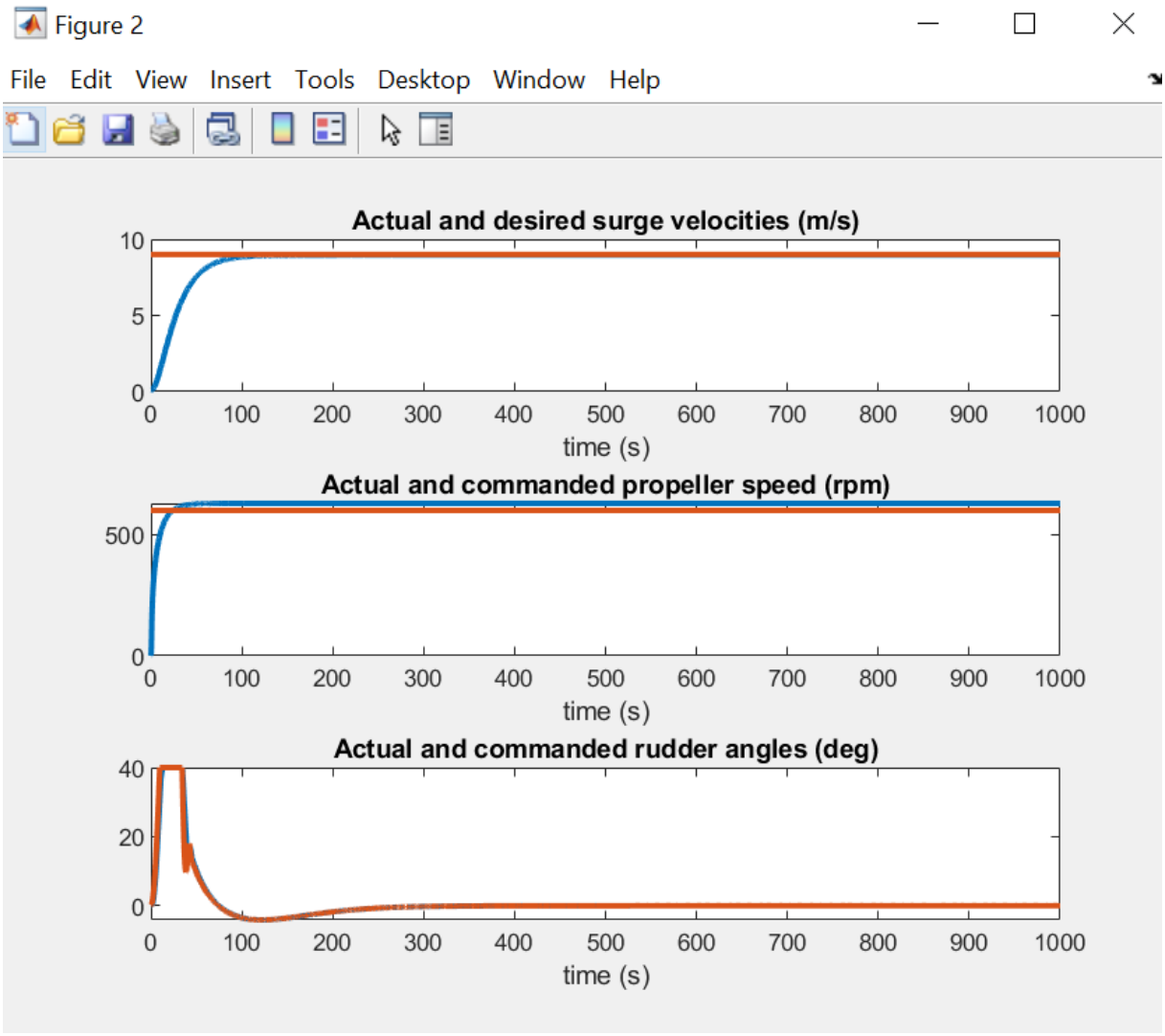
Figure 2
File Edit View Insert Tools Desktop Window Help
Actual and desired surge velocities (m/s)
10
5
0
0 100 200 300 400 500 600 700 800 900 1000
time (s)
Actual and commanded propeller speed (rpm)
500
0
0 100 200 300 400 500 600 700 800 900 1000
time (s)
Actual and commanded rudder angles (deg)
40
20
0
0 100 200 300 400 500 600 700 800 900 1000
time (s)

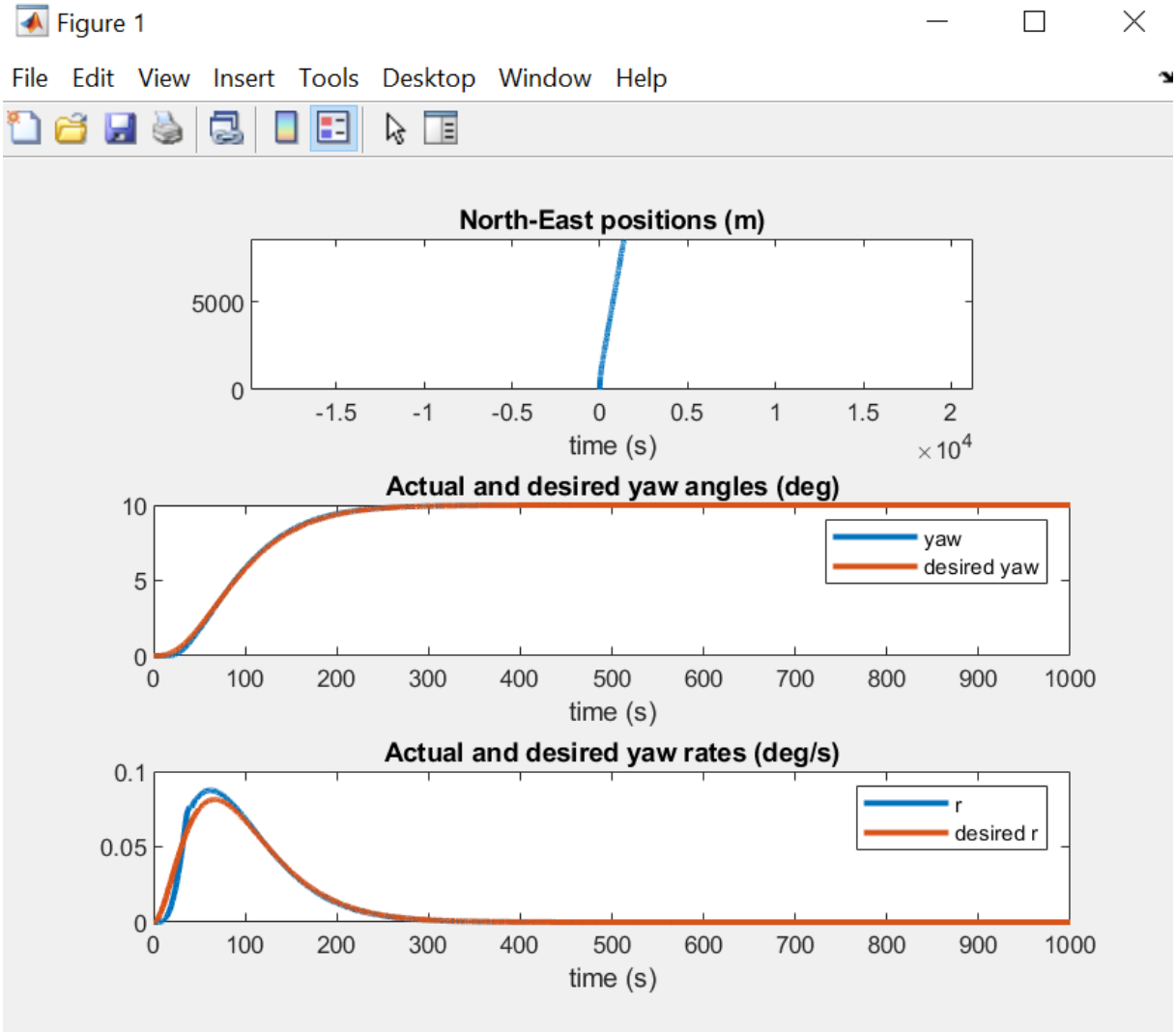
Figure 1
File Edit View Insert Tools Desktop Window Help
North-East positions (m)
5000
0
-1.5 -1 -0.5 0 0.5 1 1.5 2
time (s)
×10^4
Actual and desired yaw angles (deg)
10
5
0
yaw
desired yaw
0 100 200 300 400 500 600 700 800 900 1000
time (s)
Actual and desired yaw rates (deg/s)
0.1
0.05
0
r
desired r
0 100 200 300 400 500 600 700 800 900 1000
time (s)