ECE 4250 Final Project: Target Pursue

bpw42

December 2022

1 State Space Estimation

1.1 Single Target State Estimation without Boundaries

1.1.1 Kalman Gain vs Time for a Range of Variances

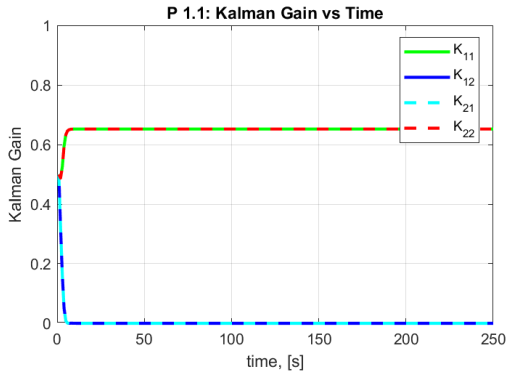

Figure 1: $\sigma_w^2 = 0.005$

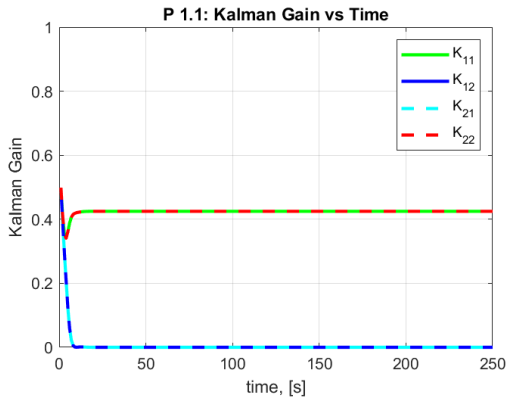

Figure 2: $\sigma_w^2 = 0.05$

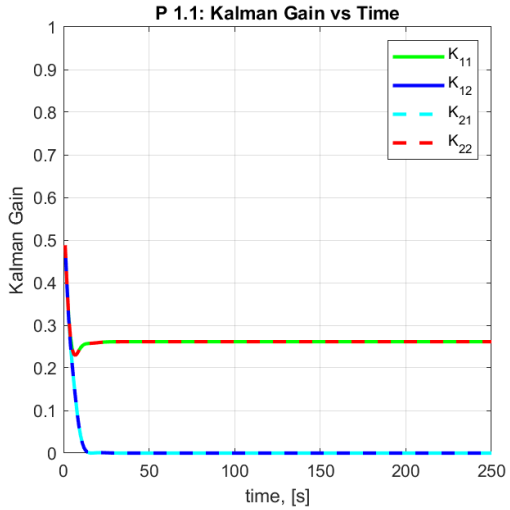

Figure 3: $\sigma_w^2 = 0.5$

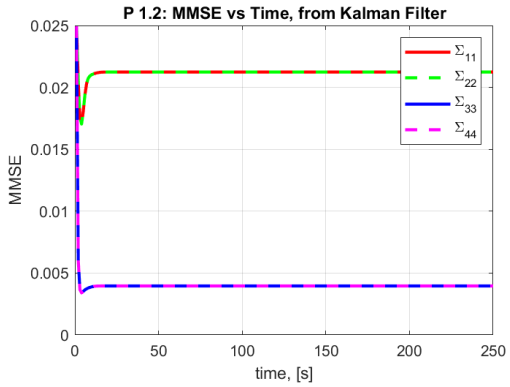

Figure 4: MMSE of Kalman Filter vs Time

1.1.2 MSE of Kalman Filter

1.1.3 Asymptotic MSE

We observe that it converges, which is what we expect!

1.1.4 Plot of Tracking

1.1.5 Monte Carlo Comparison

1.2 Single Target State Estimation with Boundaries

1.2.1 Plot of Tracking

1.2.2 Monte Carlo Comparison

1.3 Multi-Target State Estimation with Boundaries

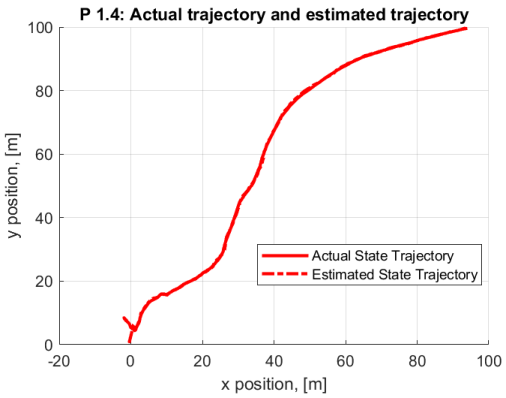

Figure 5: Plot of Tracking for Problem 1

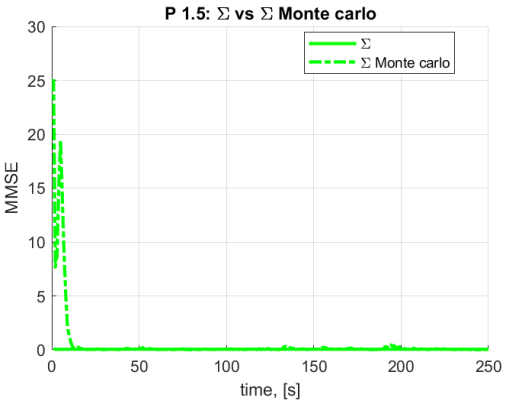

Figure 6: MMSE of Kalman Filter vs Time

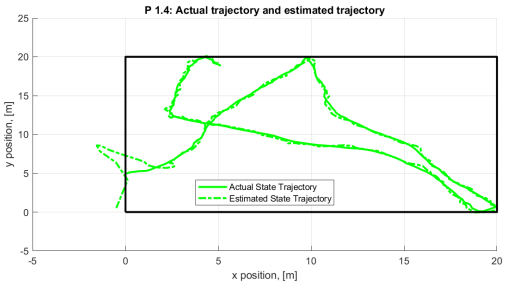

Figure 7: Plot of Tracking for Problem 2

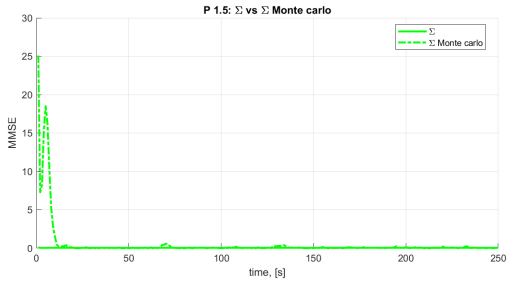

Figure 8: Monte Carlo Comparison for Problem 2

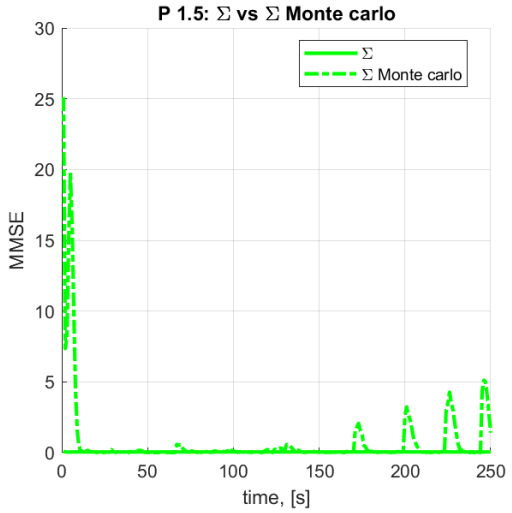

Figure 9: Tracking of initial position 1

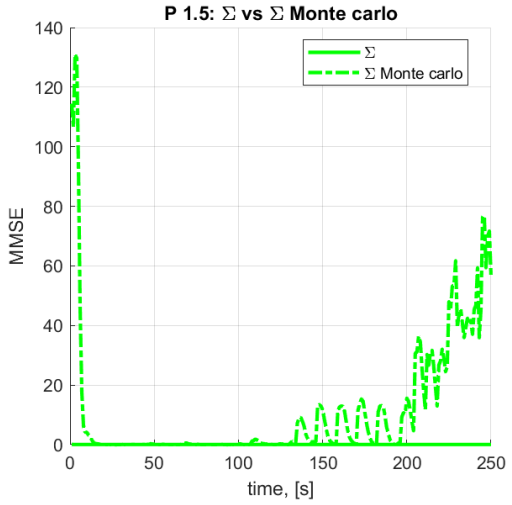

Figure 10: Tracking of initial position 2

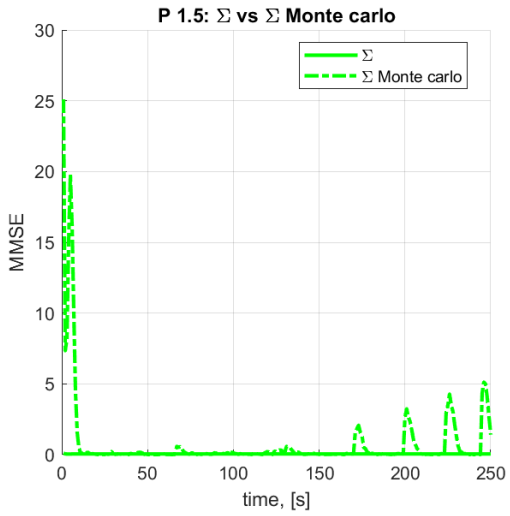

Figure 11: Tracking of initial position 3