

Exercise Round 5.

- The deadline for exercise rounds 4–6 (there are 3 exercises on each round) is **March 31, 2012**.

The answers should be sent as email to the teacher (simo.sarkka@aalto.fi) in PDF form. When sending the email, please add "S-114.4610" or "1144610" to subject. The answers can also be returned on paper to the teacher.

Exercise 1. (Unscented Kalman filter)

Derive and implement UKF to the model in Exercise 1 of Round 4, that is, to the same problem where you implemented EKF and SLF. Implement the UKF equations yourself, i.e., do not use the EKF/UKF toolbox or similar. Plot the results and compare the RMSE values of the methods.

Exercise 2. (Gauss-Hermite and Cubature Filters)

Derive and implement Gauss-Hermite and Cubature Kalman filters to the previous exercise. Can you find such parameter values for the methods, which cause the UKF, GHKF and CKF methods to become identical? Plot the results and compare the RMSE values of the methods.

Exercise 3. (Bearings Only Target Tracking with CKF and UKF)

Implement CKF and UKF to the bearings only target tracking model in Exercise 3 of Round 4. You can use the EKF/UKF toolbox, if it helps. Plot the results and compare RMSE values of different methods.