# Nonlinear Control Systems
# Exam

The exam for the Nonlinear Control Systems course will be a 20 minutes oral exam. It will consists of two parts: In the first part (approximately 10 minutes) you will be asked to solve (on the blackboard) or discuss/explain one of questions 5, 6 or 7 below. In the second part (approximately 10 minutes) you will be asked to solve (on the blackboard) or discuss/explain one of questions 1, 2, 3 or 4 below.

1) 4.16 page 184 in [Kha00].
2) 13.2 on page 544 in [Kha00].
3) Formulate stability of linear switched system with a common quadratic Lyapunov function. Give an example.
4) Formulate the problem of asymptotic stability and discuss how to verify asymptotic stability by means of sum of squares. Give an example.
5) EKF/UKF

   When is this estimation methods needed ?

   What are the differences in theory and practice ?
6) Model uncertainty

   How can a model be validated ?

   If the model is not acceptable/validated what approaches can be used ?
7) PF

   What is the differences between PF and EKF/UKF from a methodology point of view ?

   What is the differences between PF and EKF/UKF from a application/practice point of view ?

## References

[Kha00] Hassan K. Khalil. *Nonlinear Systems*. Prentice-Hall. Inc., 2000.