

Discussion Questions for Lab Exercise 1 in Automatic Control, Basic Course

General

- What is the control signal u and measurement signal y for the tank process? What does the reference signal r indicate?
- How can load disturbances and measurement noise appear in the system? What is the difference between load disturbances and measurement noise?
- What requirements might be reasonable to impose on the control of the process?

Open-Loop/Closed-Loop Control

- What is the difference between open-loop and closed-loop control?
- What is required for open-loop control to work well? What are the problems with it?
- Closed-loop control can compensate for model errors and load disturbances. Are there any problems with closed-loop control, where open-loop control might be better?
- When controlling the upper and lower tank manually, which one was easiest to control? Why?

P-Control

- How is the control signal u selected based on the measurement signal y with a P-controller?
- What is the biggest problem with the P-controller?
- How does the control change if a larger K is selected?
- Controlling the lower tank, what problems might occur when setting K to a large value?

PI-Control

- What advantages and disadvantages do PI-control have compared to P-control?
- What happens if the integral action is increased (i.e. if T_i is decreased)?

PID-Control

- What advantages and disadvantages does PID-control have compared to PI-control?
- Does the control performance improve when adding the D-part to the upper tank? Does it improve for the lower tank? Why/why not?