

Course „Control Systems 2“

Exercise Sheet 8

Task 20:

Calculate the input-output transfer function of the system

$$\begin{aligned}\dot{\underline{x}} &= \begin{bmatrix} 1 & -4 \\ 2 & -3 \end{bmatrix} \underline{x} + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u \\ y &= [0 \quad 1] \underline{x}\end{aligned}$$

- a) Is the system completely controllable? Why (not)?
- b) Is the system completely observable? Why (not)?

Task 21:

We want to analyze the input-output behavior of the system

$$\begin{aligned}\dot{\underline{x}} &= \begin{bmatrix} -2 & 0 \\ 1 & -3 \end{bmatrix} \underline{x} + \begin{bmatrix} 0 \\ 2 \end{bmatrix} u \\ y &= [0.5 \quad 0] \underline{x}\end{aligned}$$

which has already been considered in Task 19 (see Exercise Sheet 7).

- a) Determine the input-output transfer function.
- b) Give a reason for the (maybe) surprising result of subtask a) based on the block diagram of the system derived in Task 19 (see Solution to Exercise Sheet 7).