

Homework 6 – Pole placement and Ziegler-Nichols methods

Assignment 1 – Pole placement for 2nd order system

Write down your date of birth.

The transfer function of the plant is

$$F(s) = \frac{a + s}{b + s^2}$$

where a and b are given by your birth date as follows:

a = the last digit of the day of your birth

b = the last digit of the month of your birth

For example for the date 25.1.1954 is $a=5$ and $b=1$.

- 1) Design a PID controller for the plant. Place poles of the closed-loop system to $s_1 = -1$, $s_{2,3} = -0.5 \pm j0.5$.

Assignment 2 – Ziegler-Nichols method

The transfer function of the plant is

$$P(s) = \frac{1}{(s + 1)^3}$$

Design a PID controller by one of the Ziegler-Nichols methods. Proceed as follows:

- 1) Implement the model of the plant in Simulink and carry out the experiments for one of the Ziegler-Nichols methods. Document the scheme and measured signals.
- 2) Find the constant of the controllers in the measured signals.
- 3) Run the numerical simulation in Simulink and verify your design.