Series 9

Exercise 1

Dimension a PI controller and a PID controller for the following process:

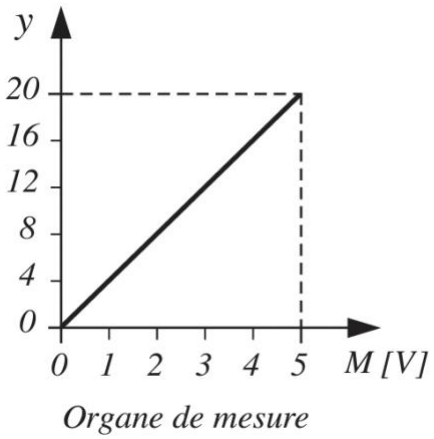
$$G(s) = \frac{2}{(s+1)(10s+1)}$$

Exercise 2

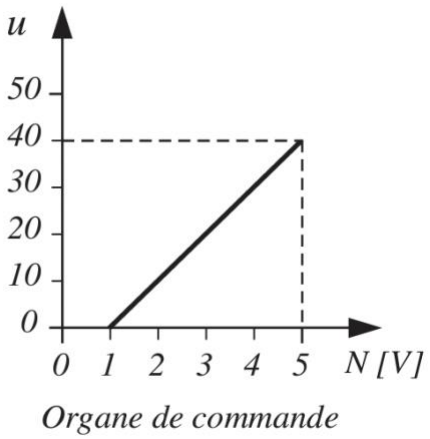
A process to be controlled is described by the following differential equation:

$$\dot{y}(t) + 0.2y(t) = 0.4u(t-1)$$

The measuring and control devices are static in nature and have the following characteristics:



Measure device



Control device

a) Calculate the transfer function of the system to be controlled $M(s)/N(s)$.
b) Dimension a PID controller for this system.
c) Numerically evaluate the static gain of the transfer function $Y(s)/Y_c(s)$ of the looped system.

Exercise 3

Consider the process:

$$G(s) = \frac{2}{2s+1}$$

And the PI controller:

$$G_R(s) = K_R\left(1 + \frac{1}{\tau_1 s}\right)$$

with $K_R = 4$ and $\tau_I = 2$. Study individually the effect of the parameters K_R and τ_I (keeping the other parameter constant) on the poles of the looped system.