

Teaching materials

Guide notes 3. Position control

MISCE project

Mechatronics for Improving and Standardizing Competences in Engineering



Competence: Control Engineering

Workgroup: Universidad de Castilla-La Mancha

Universitat Politècnica de València



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Mechatronics for Improving and Standardizing Competences in Engineering, MISCE
Competence: Control Engineering
Document: Guide notes 3. Position control

This document corresponds to the second lecture for the competence 'Control Engineering' using the 'DC-motor control platform'

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1 Objective

The main objective of this lesson is to tune a PID type controller for the position control of the output shaft of the DC-motor control platform. For this purpose, the identified transfer function of lesson 1 shall be used.

Let's assume the control scheme of Figure 1.

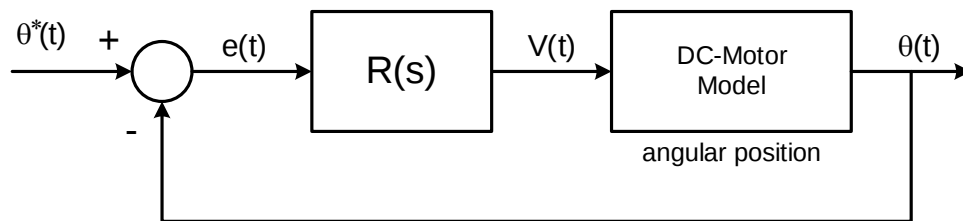


Figure 1. Control scheme: angular position

with the identified first order plant of the first practice lesson:

$$G(t) = \frac{K}{s(Ts + 1)} = \frac{A}{s(s + B)} \quad (1)$$



2 PID controller (actions)

The PID controller in terms of its proportional, integral and derivative actions can be written as:

$$R(s) = K_p + K_i \cdot \frac{1}{s} + K_d \cdot s \quad (2)$$

Controller (2) shall be tuned to satisfy the following control requirements:

- An established settling time, t_s .
- Overshoot, $M_p \approx 0\%$.
- Steady state error, $e_{ss} \approx 0$.

Please, detail here the tuning method for controller (2).





3 PID controller (zeros/poles)

The PID controller can be also written in terms of a set of zeros/poles as:

$$R(s) = K \cdot \frac{s + c}{s + p} \cdot \frac{s + c_i}{s + p_i} \quad (3)$$

Controller (3) shall be tuned to satisfy the following control requirements:

- An established settling time, t_s .
- Overshoot, $M_p \approx 0\%$.
- Steady state error, $e_{ss} \approx 0$.

Please, detail here the tuning method for controller (3).

