Control Theory Intro: Home Assignment #9

November 1, 2021

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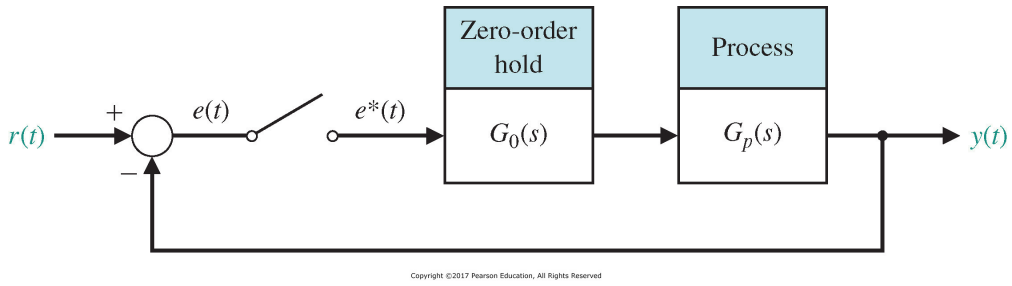

Figure 1: Discrete process control.

Introduction

The purpose of this home assignment is to base your understanding in discrete control system.

Your solutions should be presented in a PDF (not Word!) file. You should submit also a **.m** file. The first line should print your ID.

>> disp('ID_STUDENT_1 ID_STUDENT_2') % disp('ID_STUDENT_1') if only one student is submitting.

For clarity of the script, you can separate the different sections of the script with a **%%**. This will automatically create a block in your script. In order to run specifically this block of code press 'Ctrl+Enter'. To run the entire script press 'F5'.

1 Discrete control 1

A closed-loop system, as shown in Figure 1, has a process

$$G_p(s) = \frac{K(1+10s)}{s^2} \tag{1}$$

Determine the range of K for stability when T = 1 s.

2 Discrete control 2

The transfer function of a plant and a zero-order hold (Figure 1) is

$$\mathrm{G(z)}=\frac{K(z+0.2)}{z(z-1)}. \tag{2}$$

1. Plot the root locus,
2. Determine the range of gain K for a stable system.

3 Inverse Z transform

Find the inverse Z transform of:

1. $\frac{z}{(z^2-3z+2)(z-4)}$
2. $\frac{3z^2+2z+1}{z^2+3z+2}$
3. $\frac{2z}{(2z-1)^2}$