



Universidad Fidélitas

Curso: Control Automático

Tarea #7 Disminución del error en Sistemas Retroalimentados

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Disminución del error en Sistemas Retroalimentados

- Encuentre el error al escalón sin compensador.
- Proponga un compensador para que el error se corrija un 10%.

$$G(s) = \frac{1}{(s+2)(s+3)}$$

$$H(s) = 1$$

Encontramos el error al escalón sin compensador.

$$e_{ss} = \lim_{s \rightarrow 0} s * \frac{1}{1 + G(s)} * I(s)$$

$$e_{ss} = \lim_{s \rightarrow 0} s * \frac{1}{1 + \frac{1}{(s+2)(s+3)}} * \frac{1}{s}$$

$$e_{ss} = \lim_{s \rightarrow 0} \frac{1}{1 + \frac{1}{(s+2)(s+3)}}$$

$$e_{ss} = \lim_{s \rightarrow 0} \frac{1}{1 + \frac{1}{2 * 3}}$$

$$e_{ss} = 0,86$$

Encontramos el valor de Kp

$$e_{ss} = 0,86 = \frac{1}{1 + Kp}$$

$$Kp = 0,16$$

Simulado en el Octave

Transfer function 'G' from input 'u1' to output ...

1

y1: -----

$$s^2 + 5s + 6$$

Continuous-time model.

>> E

Transfer function 'E' from input 'u1' to output ...

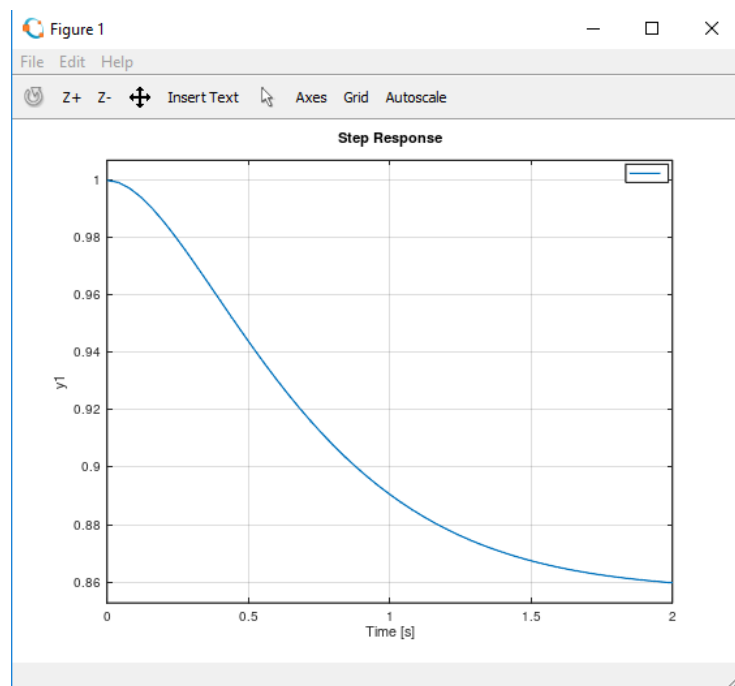
$$s^2 + 5s + 6$$

y1: -----

$$s^2 + 5s + 7$$

Continuous-time model.

>> step([E])



Ahora compensamos el error un 10%

$$0,9E * 0,86 = 0,774$$

$$0,774 = \frac{1}{1 + Kp}$$

$$Kp = 0,29$$

$$\frac{0,29}{0,16} = \frac{z}{p} = 1,81$$

$$p = -1$$

$$p = -1,81$$

Simulamos en Octave

Transfer function 'C' from input 'u1' to output ...

$$s + 1.81$$

y1: -----

$$s + 1$$

Continuous-time model.

```
>> H= series([C], [G])
```

Transfer function 'H' from input 'u1' to output ...

$$s + 1.81$$

y1: -----

$$s^3 + 6 s^2 + 11 s + 6$$

Continuous-time model.

```
>> FC= feedback([H], [1])
```

Transfer function 'FC' from input 'u1' to output ...

$$s + 1.81$$

y1: -----

$$s^3 + 6 s^2 + 12 s + 7.81$$

Continuous-time model.

Transfer function 'EC' from input 'u1' to output ...

$$s^3 + 6 s^2 + 11 s + 6$$

y1: -----

$$s^3 + 6 s^2 + 12 s + 7.81$$

Continuous-time model.

```
>> step([EC])
```

