Universidad Fidélitas

Curso: Control Automático

Tarea #7 Disminución del error en Sistemas Retroalimentados

Alumno:

Emmanuel López Soto

Profesor:

Erick Salas Chaverri

Heredia, Costa Rica II Cuatrimestre 2018

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.

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

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

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

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

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

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 + 5 s + 6
```

Continuous-time model.

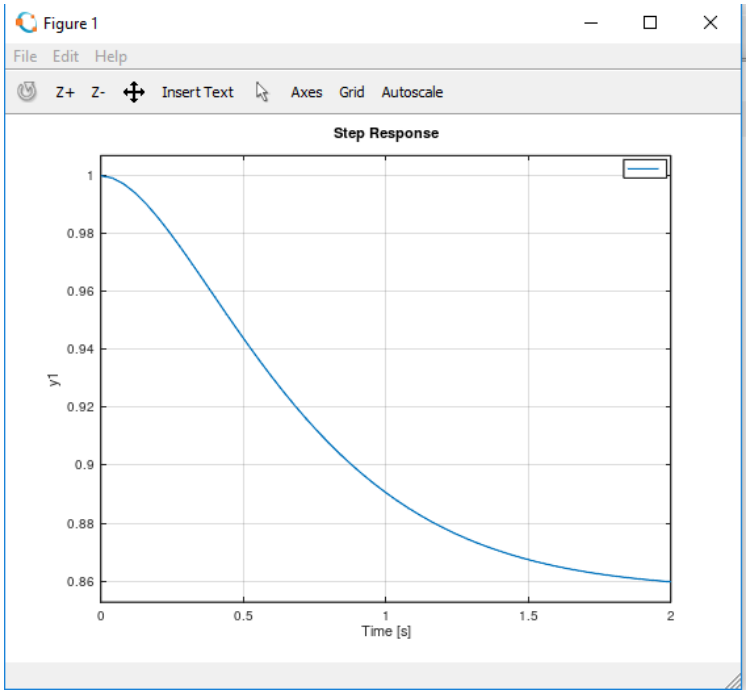
```
>> E
```

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

```
      s^2 + 5 s + 6
 y1:  ----------
      s^2 + 5 s + 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])
```

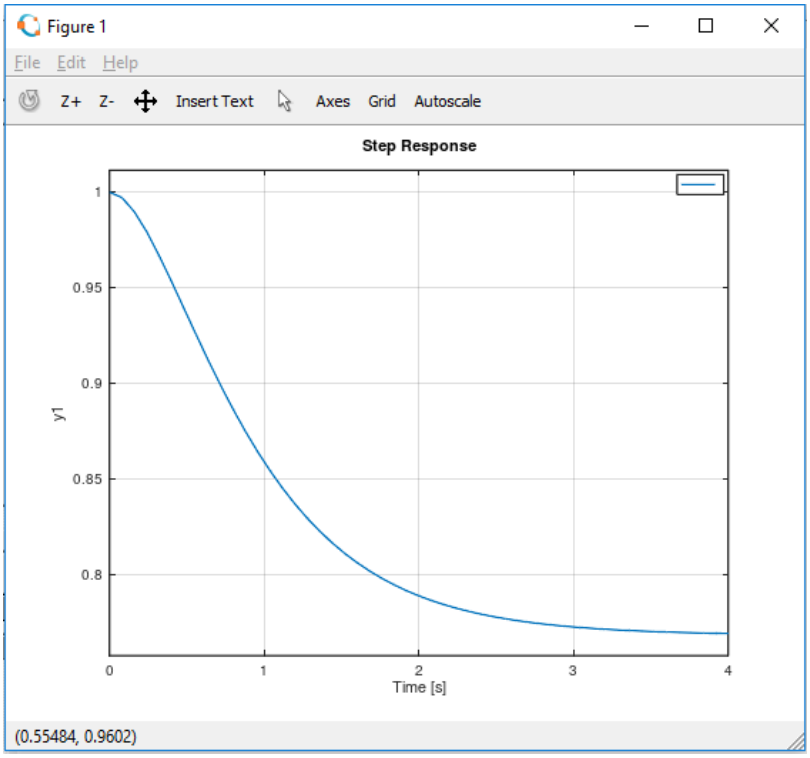


Figure 1
File Edit Help
Z+ Z- Insert Text Axes Grid Autoscale
Step Response
1
0.95
0.9
0.85
0.8
y1
0
1
2
3
4
Time [s]
(0.55484, 0.9602)