Disminución del error en Sistemas Retroalimentados

Tarea #7

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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.

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

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

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

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

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

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.

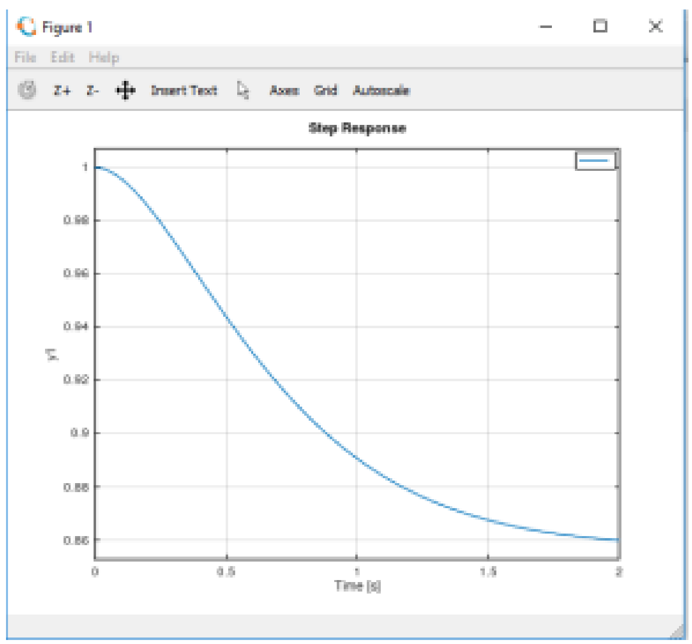
```
>> E
```

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])
```