

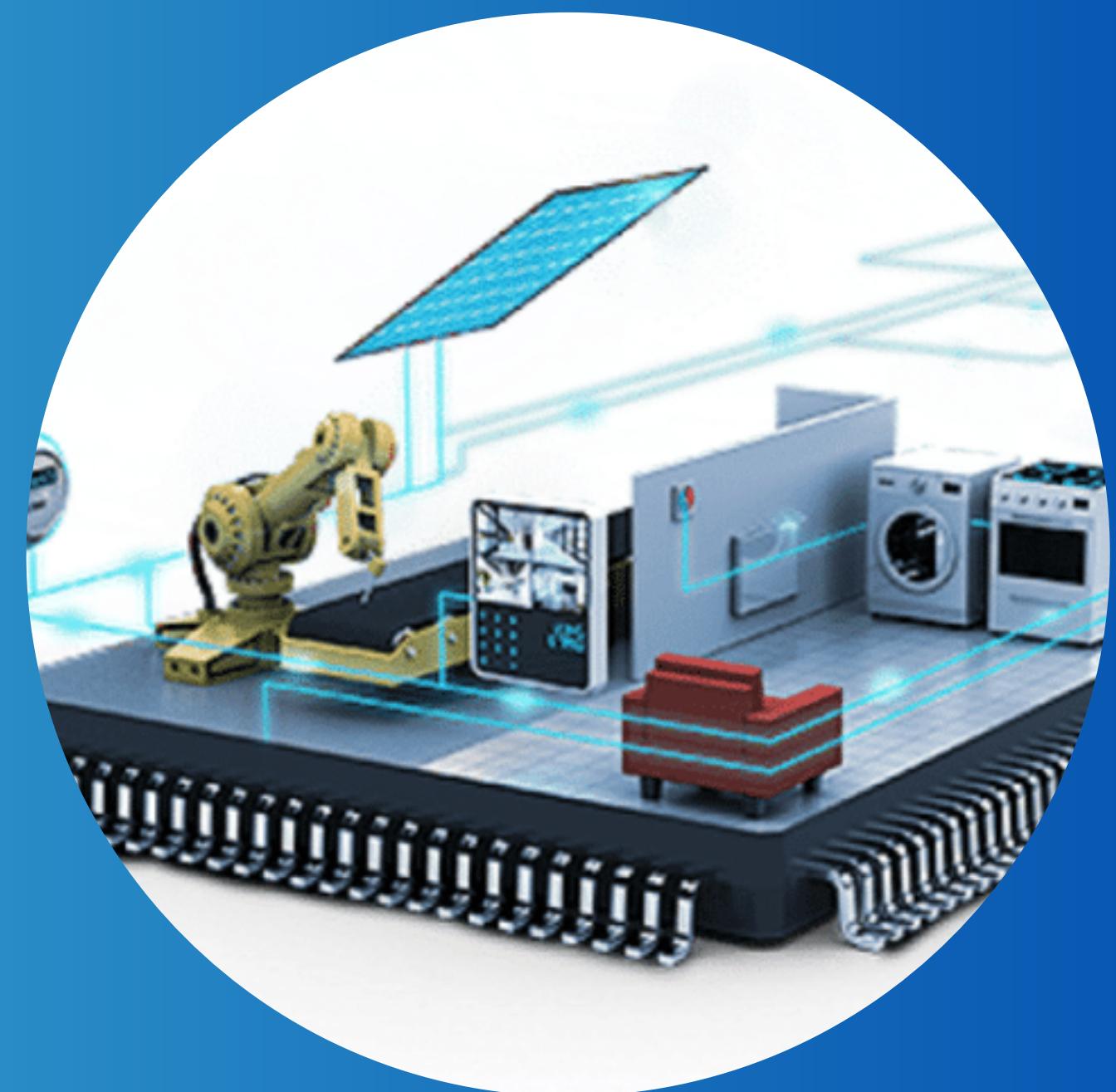
Trabalho Controle Clássico

Grupo 9

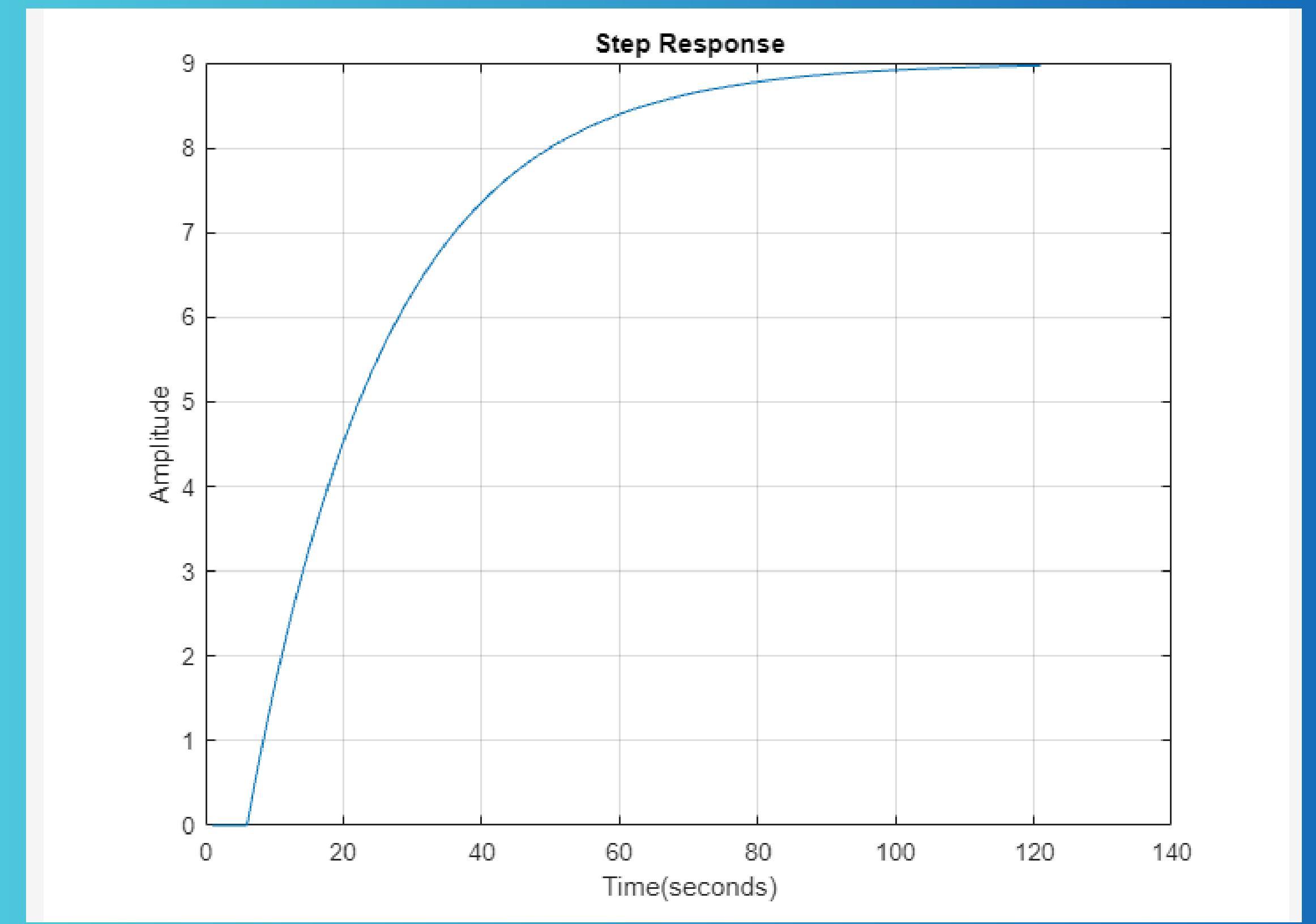
Igor Luiz Rodrigues

Rafaela Fernandes Machado

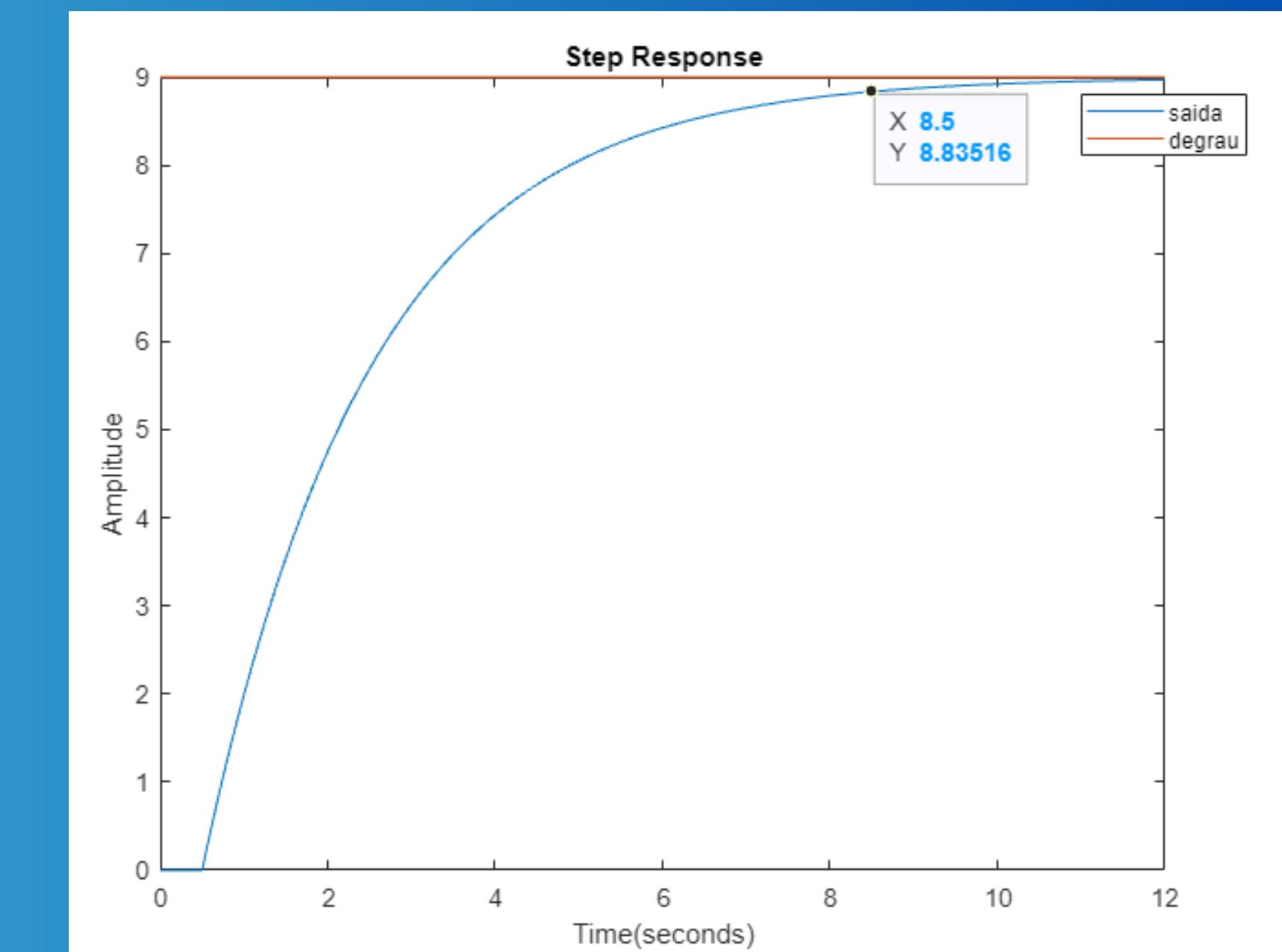
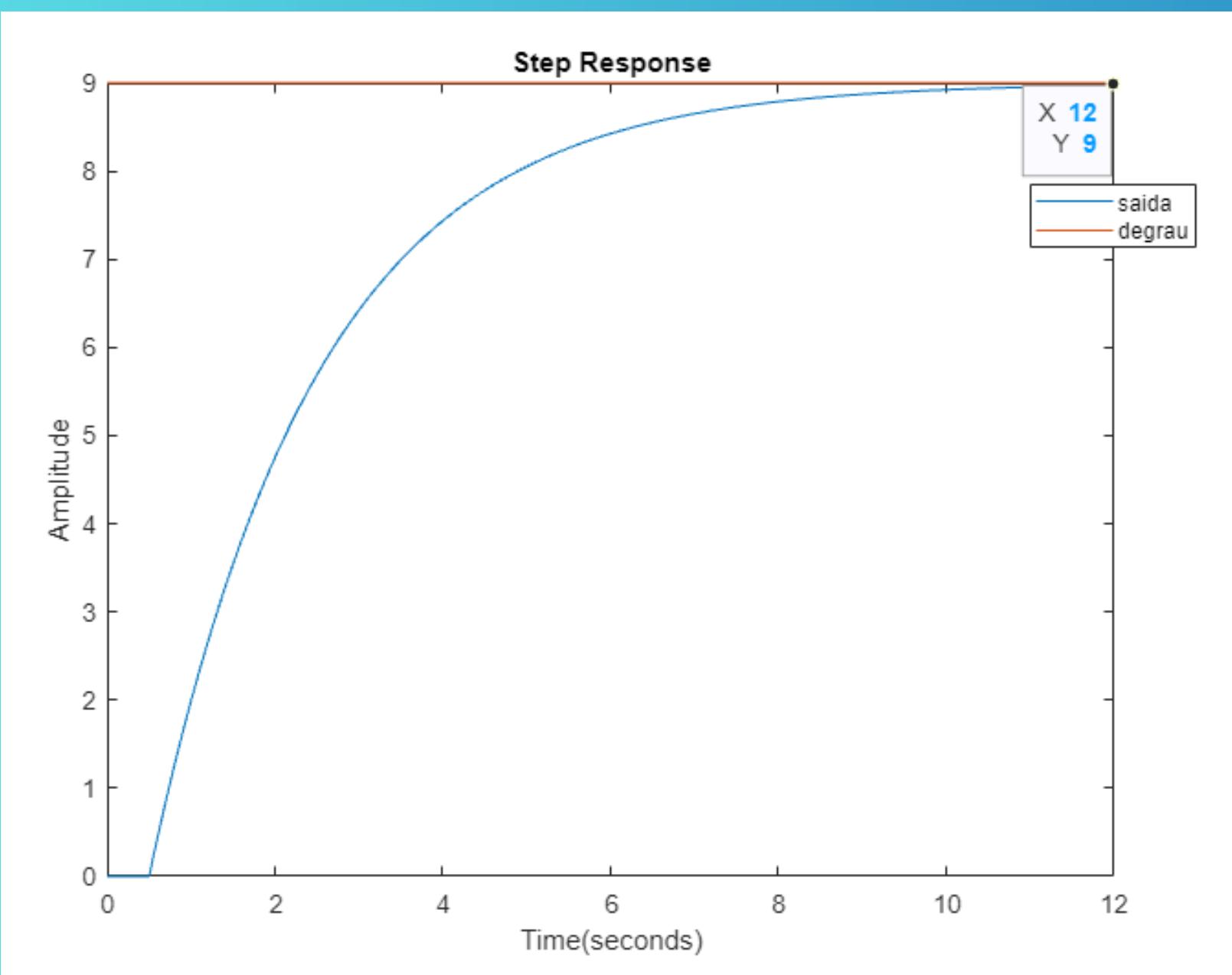
Rodrigo Paiva de Oliveira



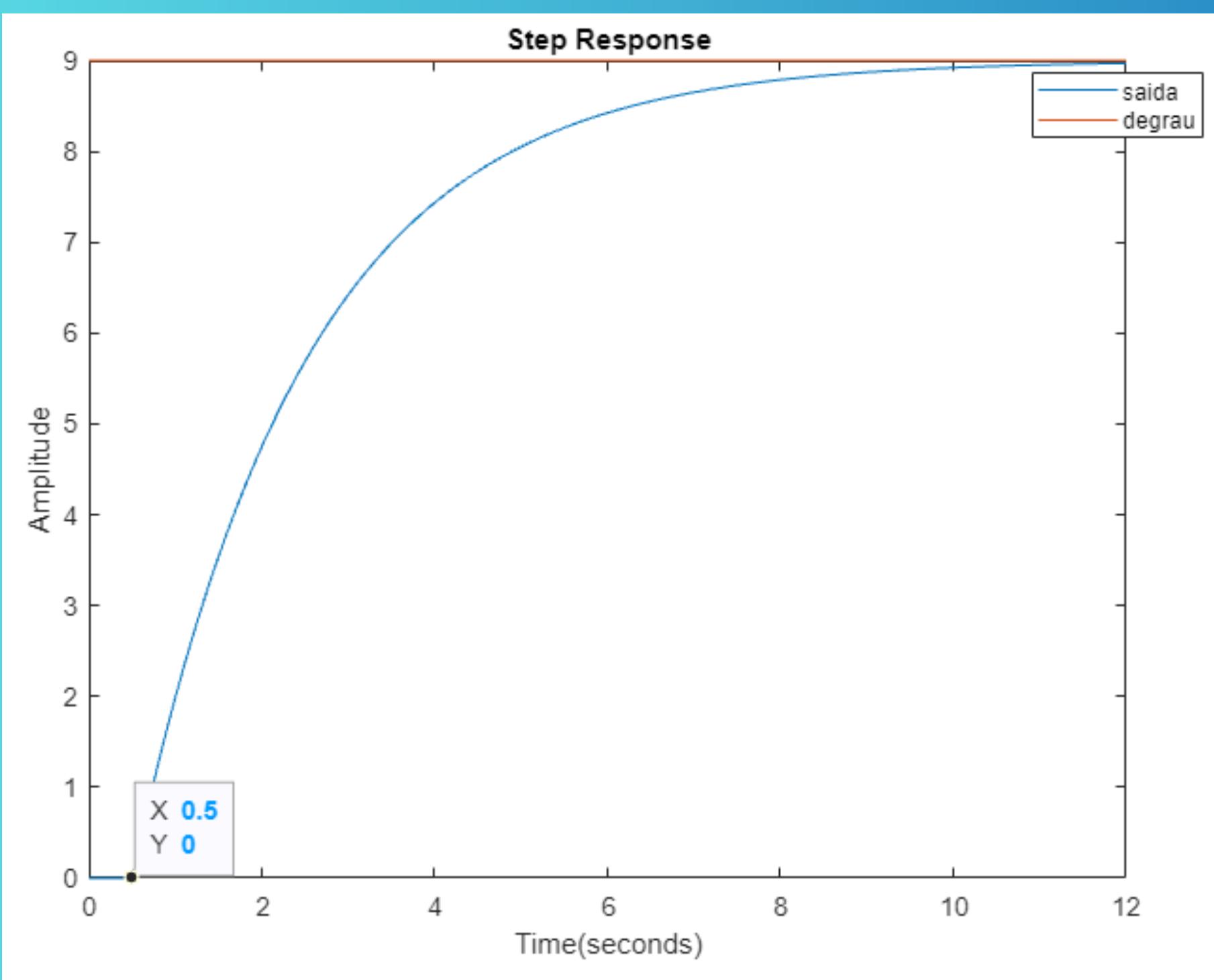
Gráfico



Método de identificação da planta:



Método de Localização:



$$K = 9/9 = 1$$

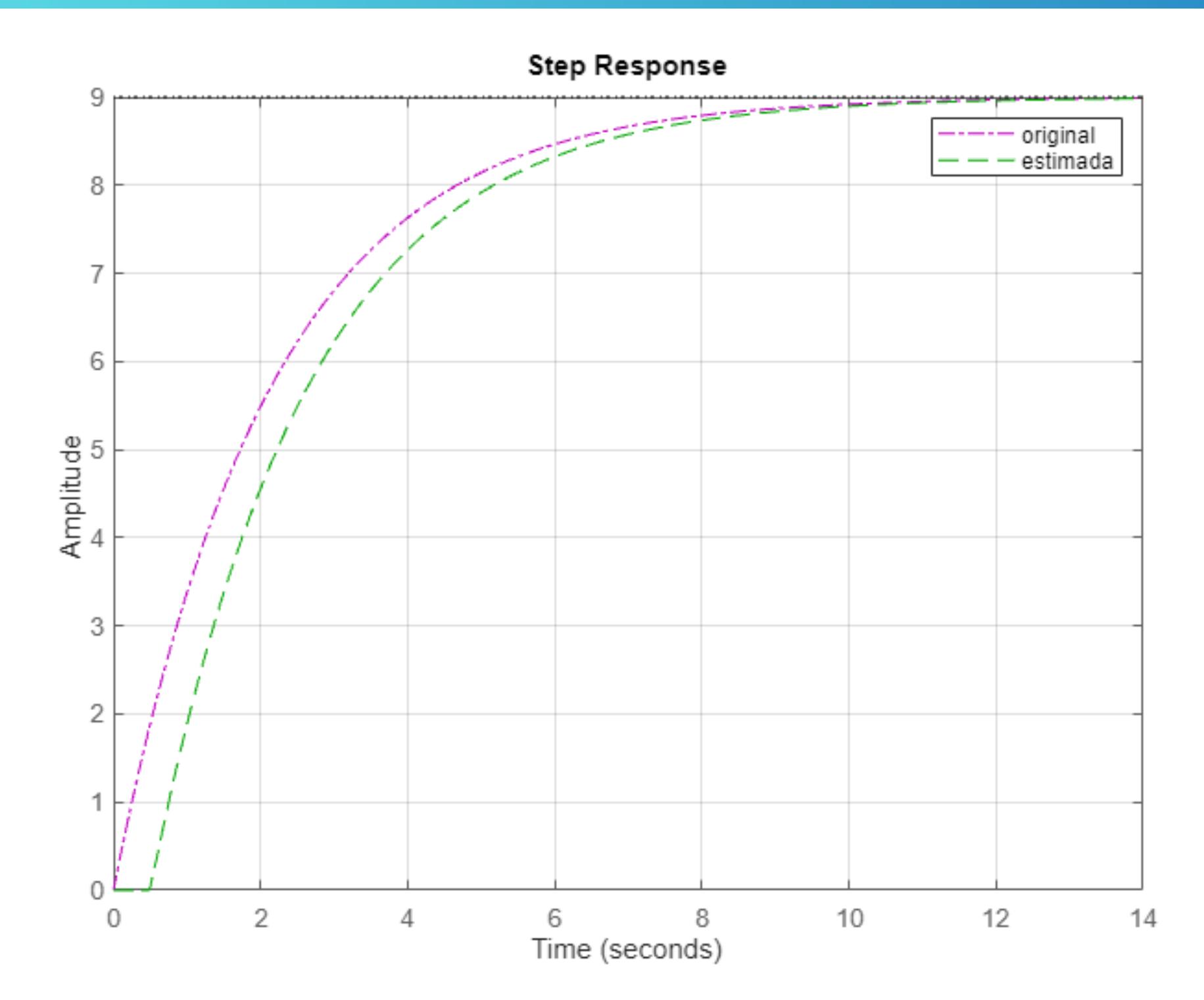
$$\tau_a = 4\tau \rightarrow 98,2\% * 9$$

$$\tau_a = 8.5/4$$

$$\tau = 2.125 \text{ s}$$

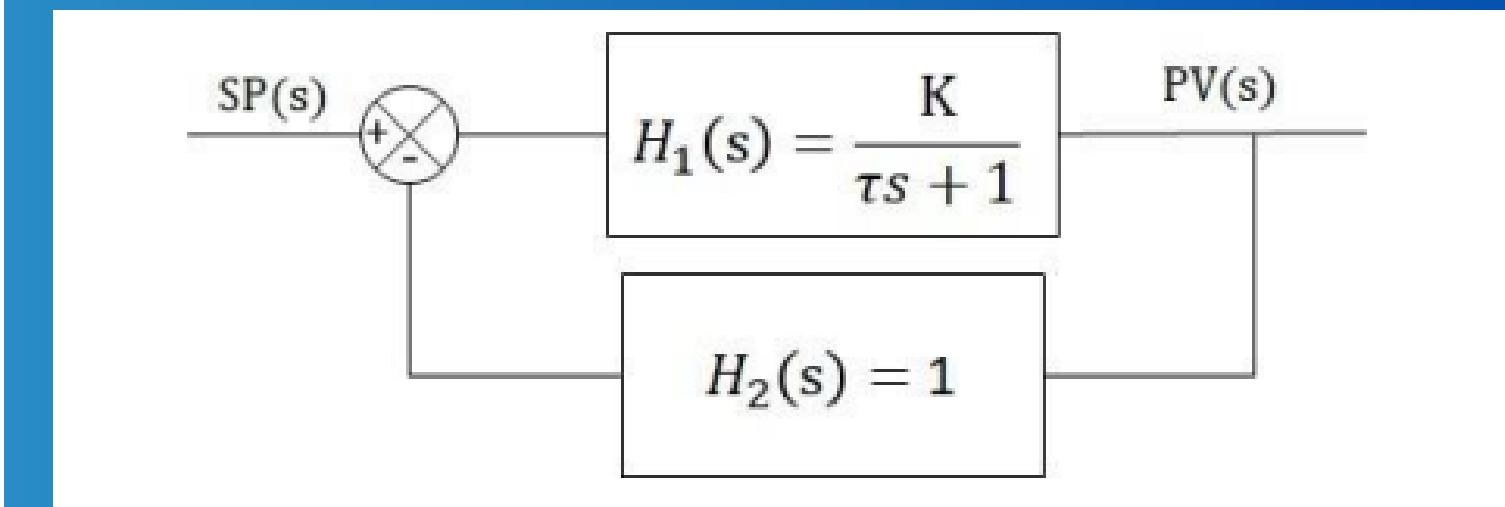
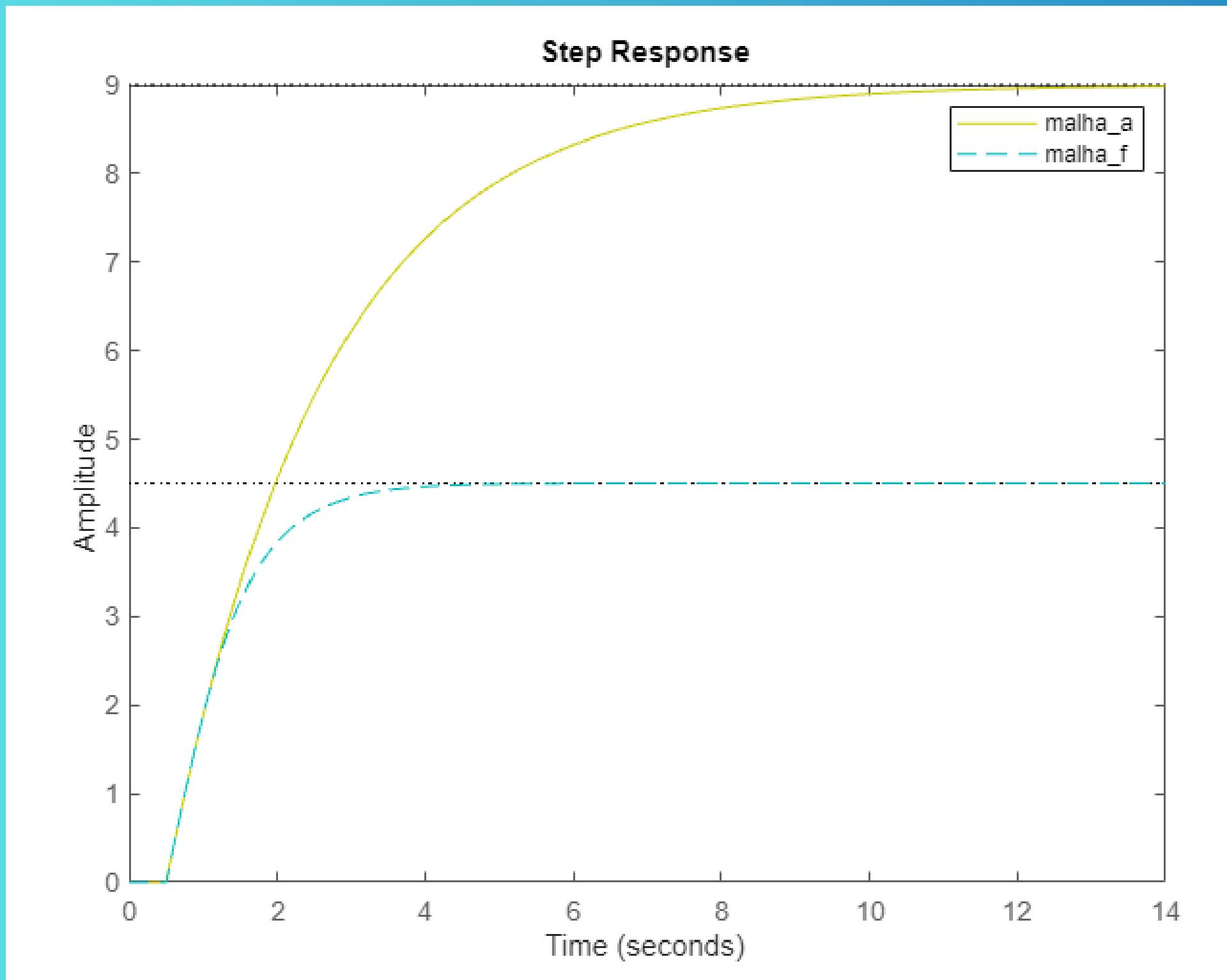
$$\theta = 0.5 \text{ s}$$

Original em relação a estimada: Plotando os gráficos:



```
>> sys = tf([1], [2.125 1])
sys_atraso = tf([1], [2.125 1])
set(sys_atraso, 'InputDelay',0.5)
sys_atraso
step(sys*9,'m-.',sys_atraso*9,'g--')
legend('original','estimada')
```

Valores de erro planta aberta e fechada:



```
>> sys_aberto = sys_atraso|  
sys_fechado = feedback(sys_aberto,1)  
step(sys_aberto*9, 'y-', sys_fechado*9, 'c--')  
legend('malha_a','malha_f')
```

Calculando Controlador CHR PID

→ CHR sem Sobrevalor:

$$K_p = (0.6 * \tau) / (K * \Theta)$$

$$K_p = (0.6 * 2.125) / (1 * 0.5)$$

$$K_p = 2.55$$

$$T_i = \tau$$

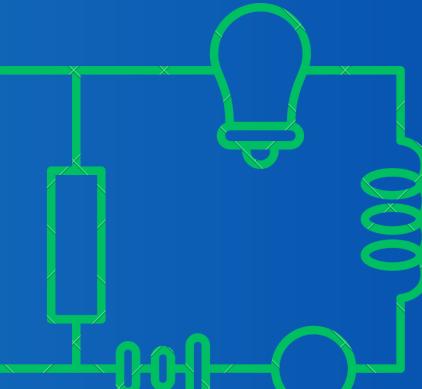
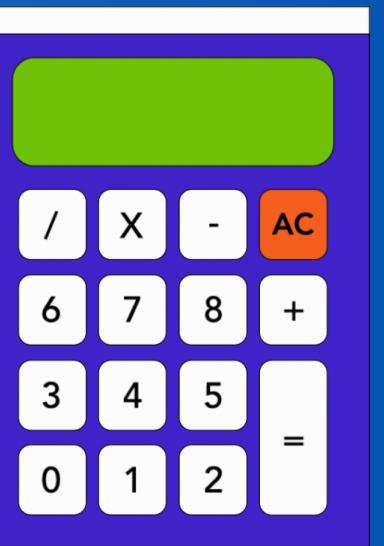
$$\tau = 2.125$$

$$T_i = 2.125$$

$$T_d = 0.5 * \Theta$$

$$T_d = 0.5 * 0.5$$

$$T_d = 0.25$$



Calculando Controlador CHR PID

→ Método Cohen e Coon para Curva de Reação:

$$K_c = \frac{1}{K} * \left(\frac{\tau}{\Theta} \right) * \left[\left(\frac{4}{3} \right) + \left(\frac{1}{4} \right) * \left(\frac{\Theta}{\tau} \right) \right]$$

$$K_c = \frac{1}{1} * \left(\frac{2.125}{0.5} \right) * \left[\left(\frac{4}{3} \right) + \left(\frac{1}{4} \right) * \left(\frac{0.5}{2.125} \right) \right]$$

$$K_c = 5.916$$

$$T_i = \Theta * \left[\left(\frac{32+6 * (\Theta / \tau)}{13+8 * (\Theta / \tau)} \right) \right]$$

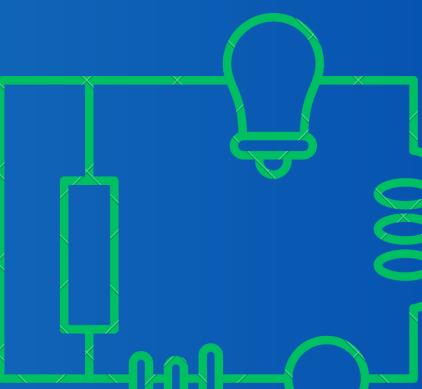
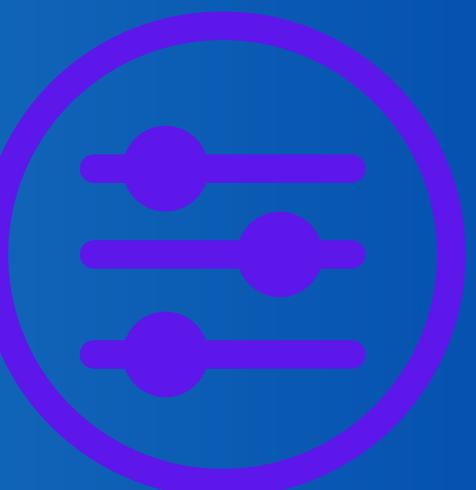
$$T_i = 0.5 * \left[\left(\frac{32+6 * (0.5 / 2.125)}{13+8 * (0.5 / 2.125)} \right) \right]$$

$$T_i = 1.122$$

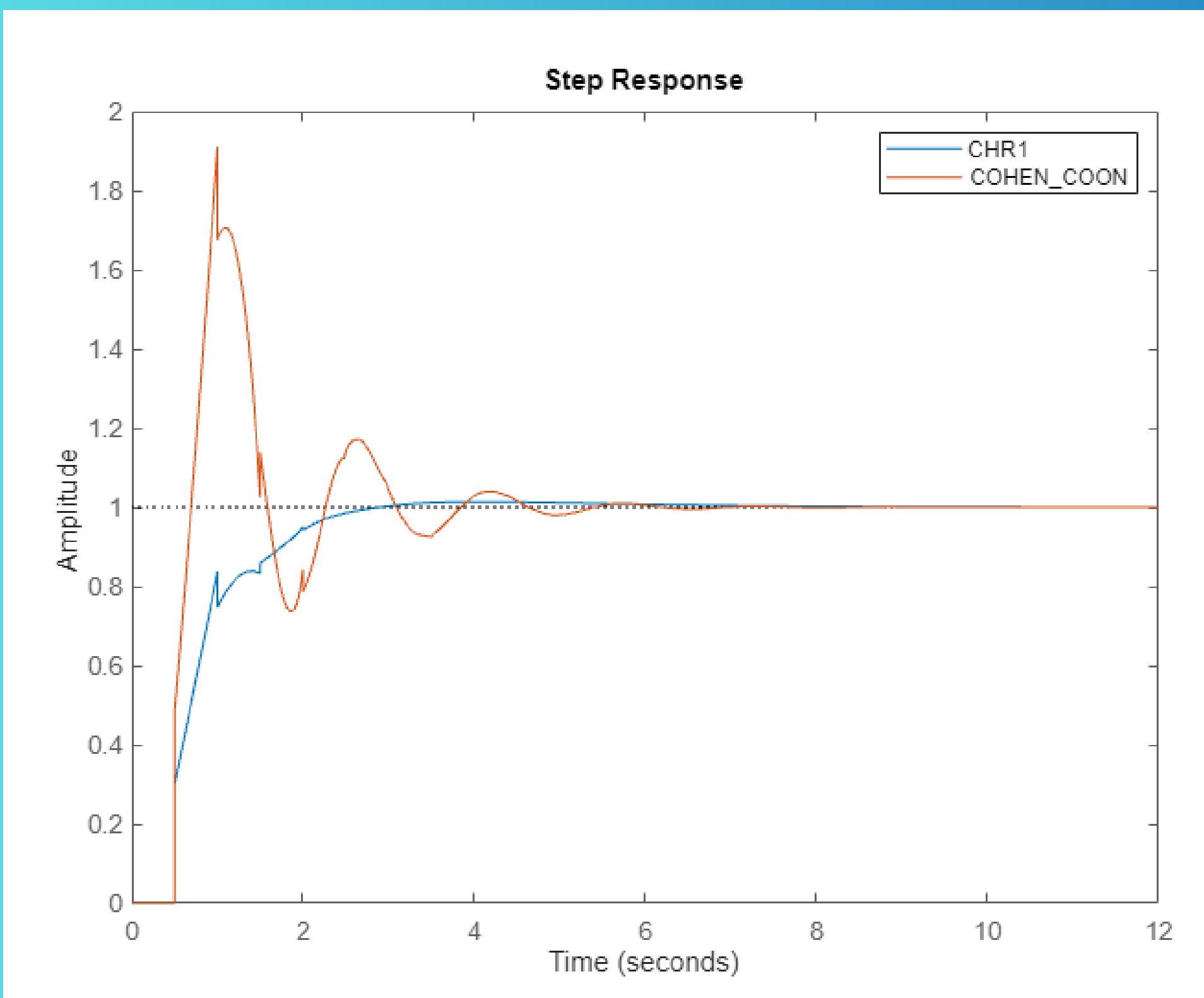
$$T_d = \Theta * \left[\left(\frac{4}{11+2 * (\Theta / \tau)} \right) \right]$$

$$T_d = 0.5 * \left[\left(\frac{4}{11+2 * (0.5 / 2.125)} \right) \right]$$

$$T_d = 0.174$$



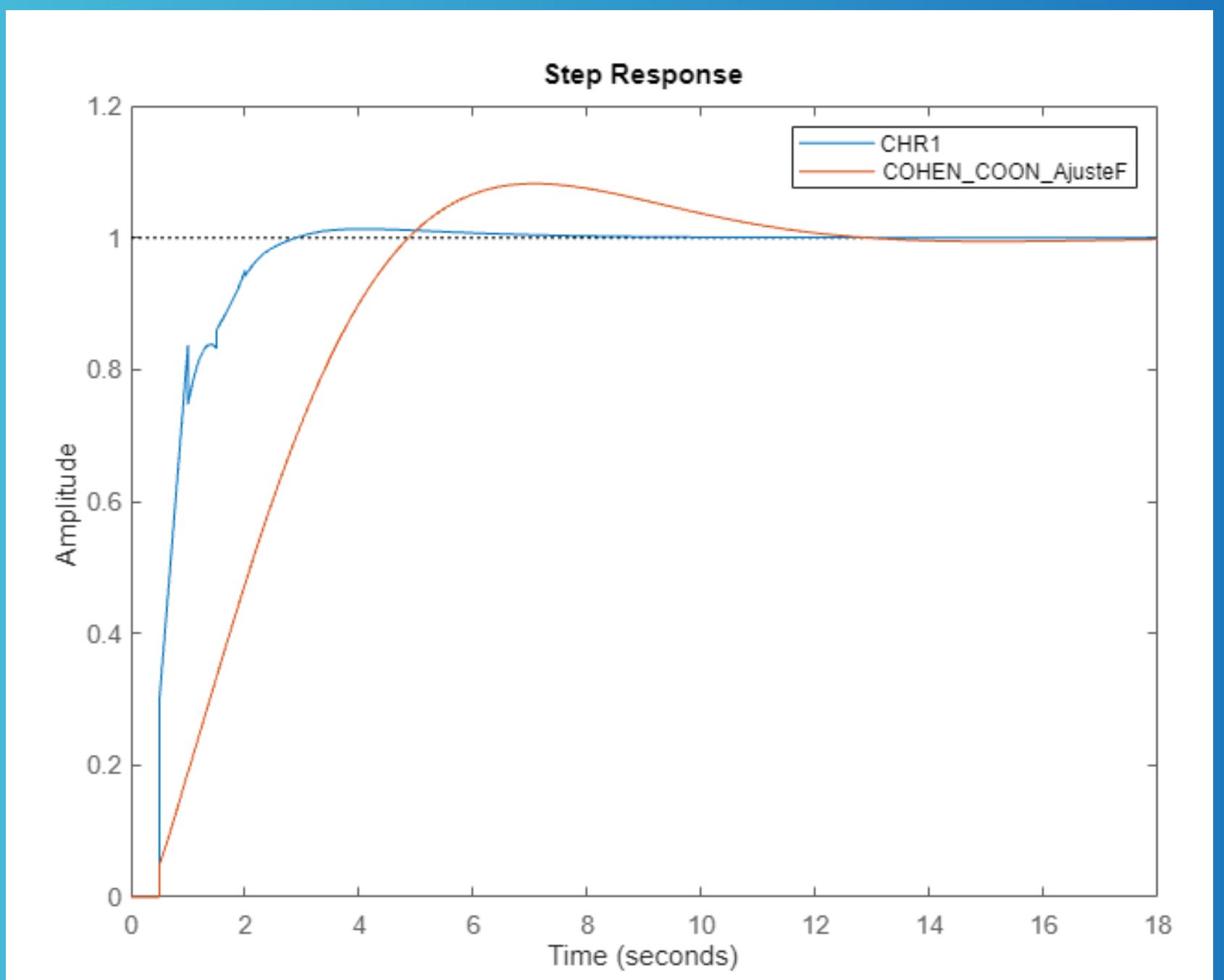
Plotando o gráfico do controlador



```
>> func = tf([1], [2.125 1], 'InputDelay', 0.5);
>> PIDCHR1 = pidstd(2.55, 2.125, 0.25);
PIDCOHEN_COON = pidstd(5.916, 1.122, 0.174);
resposta_CHR1 = feedback(func * PIDCHR1, 1);
resposta_COON = feedback(func * PIDCOHEN_COON, 1);
hold on
grid on
step(resposta_CHR1, resposta_COON)
legend('CHR1', 'COHEN_COON')
```

Plotando o gráfico com ajuste fino

Como o Cohen_Coon está com o overshoot muito alto (próximo de 90%) diminuímos o Kc do Cohen_Coon em 10 vezes ($K_c = 0.5916$).



Considerações dos métodos

