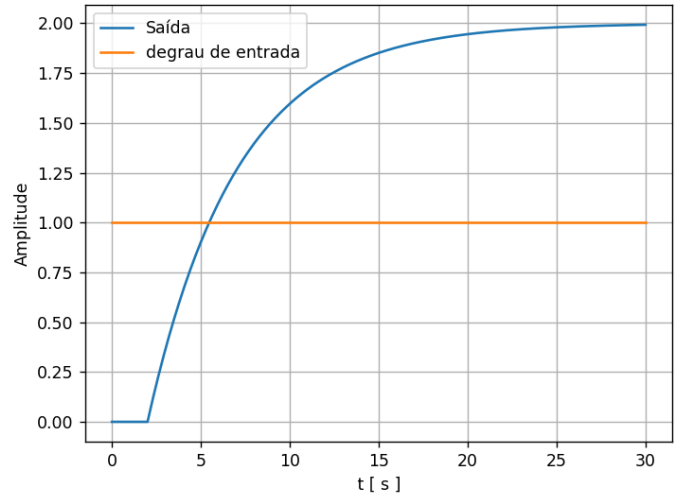
C213

1. Código Q01_02.



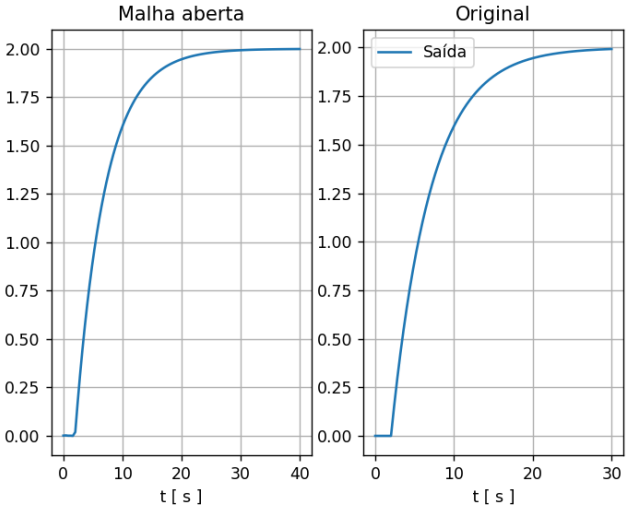
2. $K = 2$

$\tau = 1,5 * (t1 - t2) = 1,5 * (6,67 - 3,64) = 4,995$

$\theta = t2 - \tau = 6,67 - 4,995 = 1,975$

$H(s) = \frac{2e^{-1,975s}}{4,995s+1}$

3.



Código sendo plotado no arquivo Q03.py.

4. Erro em malha aberta

$e = setpoint - y$

$e = |1 - 2|$

$e = 1$

Erro em malha fechada

$e = setpoint - y$

$e = |1 - 0,66|$

$e = 0,34$

5. COHEN E COON

$Kp = \frac{1 * \tau}{K * \theta}(\frac{4}{3} + \frac{\theta}{4\tau}) = \frac{4,995}{2 * 1,975}(\frac{4}{3} + \frac{1,975}{4 * 4,995}) = 1,256 * 1,432 = 1,81$

$Ti = \theta(\frac{32 + 6(\frac{\theta}{\tau})}{13 + 8(\frac{\theta}{\tau})}) = 1,995 * (\frac{32 + 6(\frac{1,975}{4,995})}{13 + 8(\frac{1,975}{5,995})}) = 1,995 * 2,127 = 4,2$

$Td = \theta * (\frac{4}{11 + 2 * (\frac{\theta}{\tau})}) = 1,975 * (\frac{4}{11 + 2 * (\frac{\theta}{\tau})}) = 1,975 * 0,339 = 0,67$

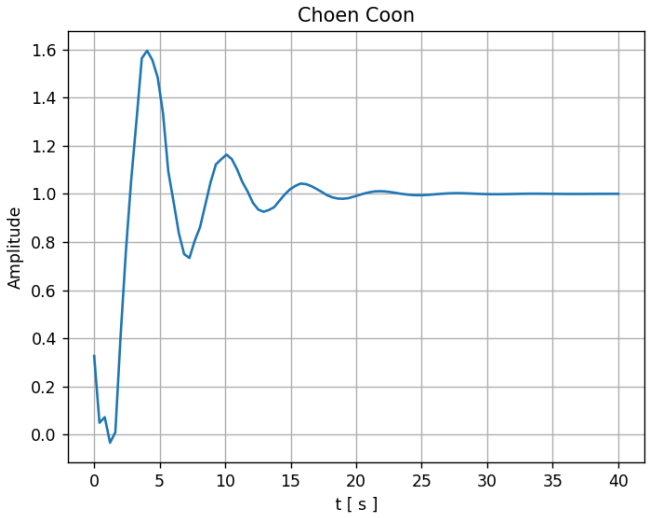
IMC

$Kp = \frac{2 * \tau + \theta}{K * (2 * \lambda + \theta)} = \frac{2 * 4,995 + 1,975}{2(2 * 1,778 + 1,975)} = \frac{11,965}{11,062} = 1,082$

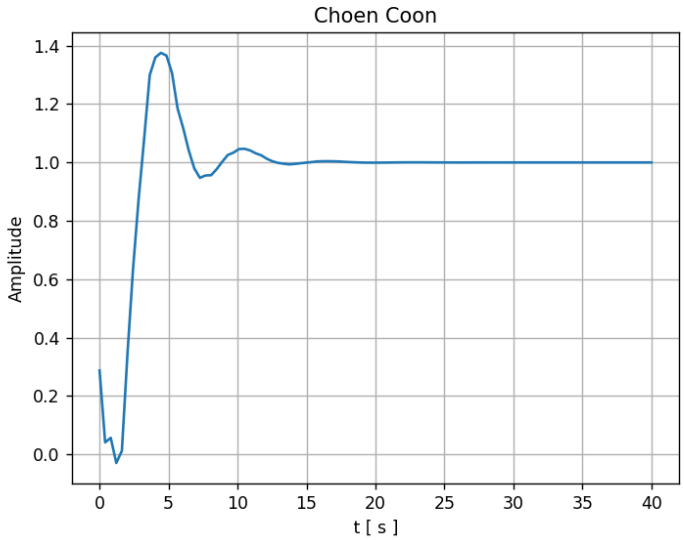
$Td = \frac{\tau * \theta}{2 * \tau + \theta} = \frac{1,975 * 4,995}{2 * 4,995 + 1,975} = \frac{9,865}{11,965} = 0,824$

$Ti = \tau * (\frac{\theta}{2}) = 4,995 * (\frac{1,975}{2}) = 4,932$

6. Ajuste do Kp.



Kp = 1,81



Kp = 1,5

7. A desvantagem percebida foi que o método Cohen-Coon tem um cálculo mais complexo, um tempo menor de estabilização e mais oscilações.