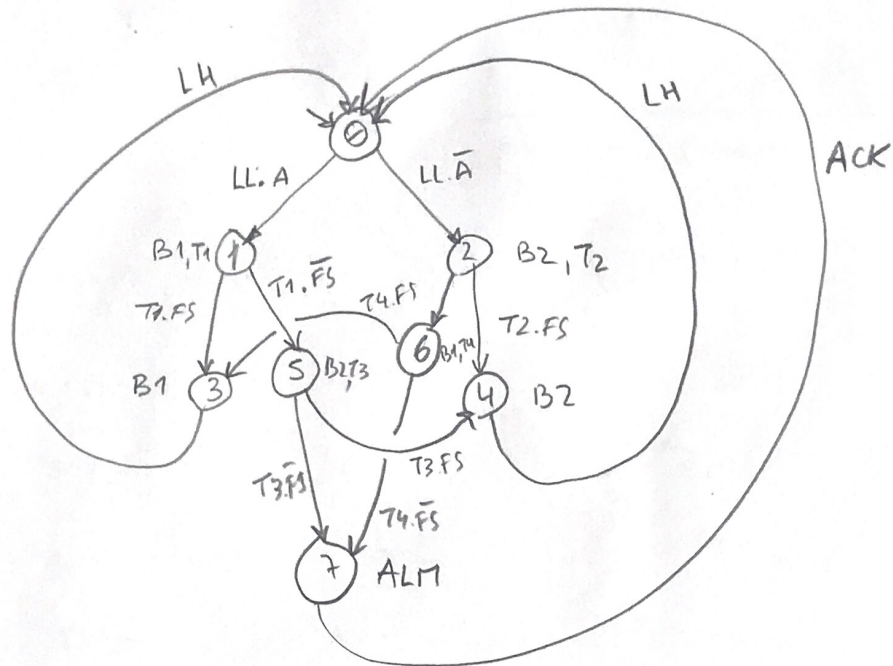


E31

2da Parcial 2019



E32

Balance de energía al contenedor: $V \rho c T^{\circ} = q \rho c (T_i - T) + P$

Peor caso de pérdidas: $Q_{PER} = -10 \cdot 72 = -720 \rightarrow 1000 \text{ kcal/seg}$

Modo ON:

$$\begin{cases} 500 \cdot T^{\circ} + T = 115 \\ T(0) = 68^{\circ}\text{C} \end{cases} \rightarrow T(s) = \frac{115}{s(500s+1)} + \frac{68}{s+1/500}$$

$$T_{ON}(t) = 115 (1 - e^{-t/500}) + 68 e^{-t/500}$$

$$T_{ON}(t_{ON}) = 72^{\circ}\text{C} = 115 - 47 \cdot e^{-t_{ON}/500} \rightarrow e^{-t_{ON}/500} = \frac{43}{47} \rightarrow t_{ON} = 44,5 \text{ seg}$$

Modo OFF:

$$\begin{cases} 500 \cdot T^{\circ} + T = 15 \\ T(0) = 72^{\circ}\text{C} \end{cases} \rightarrow T(s) = \frac{15}{s(500s+1)} + \frac{72}{s+1/500}$$

$$T_{OFF}(t) = 15 \cdot (1 - e^{-t/500}) + 72 e^{-t/500}$$

$$T_{OFF}(t_{OFF}) = 68^{\circ}\text{C} = 15 + 57 \cdot e^{-t_{OFF}/500} \rightarrow e^{-t_{OFF}/500} = \frac{53}{47} \rightarrow t_{OFF} = 36,9 \text{ seg}$$

Periodo: $T = t_{ON} + t_{OFF} = 81,4 \text{ seg}$

Es 3

$$P(s) = \frac{0,5}{s(s+1)(0,1s+1)}$$

ω	$\text{Arg}\left(\frac{1}{(1+j\omega)}\right)$	$\text{Arg}\left(\frac{1}{1+0,1j\omega}\right)$	$\text{Arg}(H(j\omega))$	$ H(j\omega) $
1	-45°	$-5,71^\circ$	$-140,71^\circ$	0,35
0,5	$-26,6^\circ$	$-2,9^\circ$	-120°	0,89
0,9	-42°	-5°	-137°	0,41
0,85	$-40,36^\circ$	$-4,86^\circ$	-135°	0,45

$\text{MF} = 45^\circ$ en $\omega =$ rad/seg con un módulo de

luego: $k = \frac{1}{0,45} = 2,22$

2	$-63,43^\circ$	$-11,31^\circ$	-165°	0,11
3	$-71,57^\circ$	$-16,7^\circ$	-178°	0,05
3,2	$-72,65^\circ$	$-17,74^\circ$	-180°	0,04

$$\text{MG} = \frac{1}{2,22 \cdot 0,04} = 11,26$$

Como es inestable en lazo abierto solo puedo explicar

ciclo continuo: $\omega = 3,2 \rightarrow T_u = 0,3$ seg

$$k = 11,26 \cdot 2,22 = 25$$