7/9 - 17 Torsdag (lab 2)

- Byggde upp model av process i simulink med alla inst. som beskrivs i manualen.
- Börjar med stegsvar för ~~40 → 43~~ 45 → 47

Okulär dödtid 10,47 − 10 = 0,47 sec = L

plot(t, S)

47 → 52

Okulärt dödtid 0,60 = L

52 − 62

Okulärt dödtid 0,72 = L

Ex 3: (52–62) $\Delta y_3 = 96{,}6 - 56{,}3 = 40{,}3$ $\qquad \frac{40{,}3}{3} = 13{,}43 = \frac{\Delta y}{3}$

$\Delta y \cdot \frac{2}{3} = 26{,}866$

$T_{2/3} = 83{,}67 - L_3 = 83{,}67 - 0{,}72 = 82{,}95$

$T_{1/3} = 35{,}68 - L_3 = 35{,}68 - 0{,}72 = 34{,}96$

Ex 2: (47–52) $\Delta y_2 = 56{,}~~36~~ - 36{,}36 = 20$ $\qquad \frac{\Delta y}{3} = \frac{20}{3} = 6{,}67$

$\Delta y_2 \cdot \frac{2}{3} = 13{,}33$ $\qquad \Delta y \frac{2}{3} + 36{,}36 = 49{,}69 \rightarrow T_{2/3} = 72{,}55 - L_2 = 71{,}95$

$\Delta y \frac{1}{3} + 36{,}36 = 43{,}03 \rightarrow T_{1/3} = 29{,}82 - L_2 = 29{,}12$

Ex 1: (45–47) $\Delta y_1 = 36{,}5 - 30{,}07 = 6{,}43$ $\qquad \frac{\Delta y_1}{3} = 2{,}14$

$\Delta y_1 \cdot \frac{2}{3} = 4{,}29$

$30{,}07 + 2{,}14 = 32{,}21 \Rightarrow$

$\Rightarrow T_{1/3} =$ ~~24,06~~ $25{,}76 - L_1 = 25{,}29$ $\qquad L_1 = 0{,}47$

$30{,}07 + 4{,}29 = 34{,}36 \Rightarrow$

$\Rightarrow T_{2/3} = 64{,}26 - L_1 = 63{,}79$

Ex 45-50

$\Delta y_2 = 50{,}05 - 31{,}83 = 18{,}22$ $\quad \Delta y\frac{1}{3} = 6{,}0733$

$\Delta y\frac{2}{3} = 12{,}1467$

$T_{\frac{2}{3}} = 66{,}96 - L_{45-50} = 66{,}65$ ($L_{45-50} = 0{,}31$)

$T_{\frac{1}{3}} = 27{,}52 - L_{45-50} = 27{,}21$

Ex 45-55

$\Delta y_3 = 69{,}41 - 32{,}79 = 36{,}82$ $\quad \Delta y\frac{1}{3} = 12{,}2733$

$\Delta y\frac{2}{3} = 24{,}5466$

$T_{\frac{1}{3}} = 42{,}645 - 9{,}95 - L_{45-55} =$

$T_{\frac{2}{3}} = 89{,}45 - 9{,}95 - L_{45-55} =$

$L_{45-55} = 0{,}78 \Rightarrow T_{1/3} = 31{,}915$

$T_{2/3} = 78{,}72$

$K_{45-47} = \frac{\Delta y_1}{\Delta u_1} = [\Delta u = 47-45] = \frac{6{,}43}{2} = 3{,}215 = K_1$

$K_{45-50} = \frac{\Delta y_2}{\Delta u_2} = [\Delta u_2 = 50-45] = \frac{18{,}22}{5} = 3{,}644 = K_2$

$K_{45-55} = \frac{\Delta y_3}{\Delta u_3} = [\Delta u_3 = 55-45] = \frac{36{,}82}{10} = 3{,}682 = K_3$

$K_{55-65} = \frac{\Delta y_4}{\Delta u_4} = [\Delta u_3 = 65-55] = \frac{40{,}3}{10} = 4{,}03 = K_4$

$K_{47-52} = \frac{\Delta y_5}{\Delta u_5} = [\Delta u_5 = 52-47] = \frac{20}{5} = 4{,}0 = K_5$

$$Q_1 = \frac{t_{1,2/3}}{t_{1,1/3}} = \frac{63,79}{25,29} = 2,52$$

$$Q_2 = [\quad] = \frac{66,65}{27,21} = 2,45$$

$$Q_3 = [\quad] = \frac{78,72}{31,915} = 2,47$$

$$Q_4 = [\quad] = \frac{71,95}{29,12} = 2,47$$

$$Q_5 = [\quad] = \frac{82,95}{34,96} = 2,37$$

$P_1 = [\text{enl. tabell}] = 1,0945$

$P_2 = [\text{ — ,, — }] = 1,094$

$P_3 = [\text{ — ,, — }] = 1,094$

$P_4 = [\text{ — ,, — }] = 1,094$

$P_5 = [\text{ — ,, — }] = 1,093$

$a_1 = [\text{enl. tabell}] = 0,04$

$a_2 = [\text{ — ,, — }] = 0,06$

$a_3 = [\text{ — ,, — }] = 0,05$

$a_4 = a_3$

$a_5 = [\text{enl. tabell}] = 0,08$

$$T_1 = \frac{t_{1,3/3}}{P_1(1+a)} = \frac{63,79}{1,0945(1+0,04)} = 56,04$$

$$T_2 = [\quad] = \frac{66,65}{1,094(1+0,06)} = 57,4747$$

$$T_3 = [\quad] = \frac{78,72}{1,094(1+0,05)} = 68,53$$

$$G(s) = \frac{K \cdot e^{-Ls}}{(1+Ts)(1+aTs)}$$

$$G_1(s) = \frac{K_1 \cdot e^{-L_1 s}}{(1+T_s)(1+a_1 T_s)} = \frac{3,215 \cdot e^{-0,47s}}{(1+56,04s)(1+0,04 \cdot 56,04s)}$$

$$G_2(s) = \frac{3,644 \cdot e^{-0,31s}}{(1+57,4747s)(1+0,06 \cdot 57,4747s)}$$

$$G_3(s) = \frac{3,682 \cdot e^{-0,78s}}{(1+68,53s)(1+0,05 \cdot 68,53s)}$$