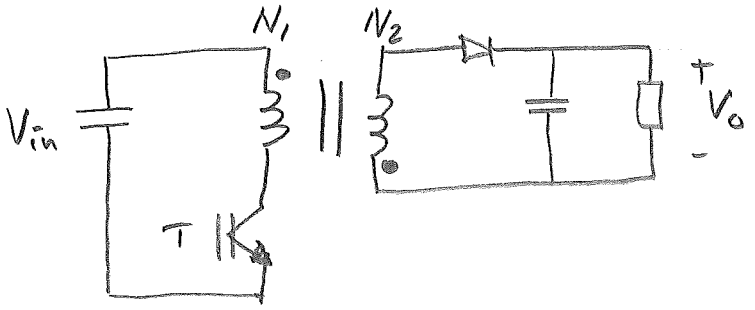
BWW Uppg. 17.13



T = ON: $V_{in} - \mathcal{L}_m' \frac{di_m'}{dt} = 0 \Rightarrow \Delta i_m' = \frac{V_{in}}{\mathcal{L}_m'} \cdot t_T$

T = OFF: $-\mathcal{L}_m'' \frac{di_m''}{dt} - V_o = 0 \Rightarrow |\Delta i_m''| = \frac{V_o}{\mathcal{L}_m''} \cdot t_D$

↑ negativ derivata

Överför till primärsidan:

$$\Delta i_m' \cdot \frac{N_1}{N_2} = \frac{V_o}{\mathcal{L}_m' \left(\frac{N_2}{N_1}\right)^2} \cdot t_D \Rightarrow$$

$$\Delta i_m' = \frac{V_o}{\mathcal{L}_m' \frac{N_2}{N_1}} \cdot t_D = \frac{V_o}{\mathcal{L}_m'} \cdot \frac{N_1}{N_2} \cdot t_D$$

LIKHET:

$$\frac{V_{in}}{\mathcal{L}_m'} \cdot t_T = \frac{V_o}{\mathcal{L}_m'} \cdot \frac{N_1}{N_2} \cdot t_D$$

$$V_{in} \cdot t_T = V_o \cdot \frac{N_1}{N_2} \cdot t_D$$

Eftersom $\Delta i = I_o/2$ kan man anta ansluten drift. Alltså $t_D = T - t_T$

$$V_{in} \cdot T \cdot \delta = V_o \cdot \frac{N_1}{N_2} (1-\delta) \cdot T$$

i) $\frac{N_1}{N_2} = \frac{V_{in}\delta}{V_o(1-\delta)}$ $\quad \left.\begin{matrix} V_{in} = 50 \\ V_o = 25 \\ \delta = 0{,}4 \end{matrix}\right\} \Rightarrow \frac{N_1}{N_2} = \frac{50 \cdot 0{,}4}{25(1-0{,}4)} = \frac{4}{3}$

ii) $\Delta i = \frac{I_o}{2} = \frac{25/5}{2} = 2{,}5\,A$

Räkna på sekundärsidan:

$$\mathcal{L}_m'' = \frac{V_o}{\Delta i_m''/\Delta t} = \frac{V_o}{\Delta i_m''} \cdot t_D = \frac{25}{2{,}5} \cdot 0{,}6 \cdot \frac{1}{20\,kHz} = 0{,}3\,mH$$

På primärsidan: $\mathcal{L}_m' = \left(\frac{N_1}{N_2}\right)^2 \cdot \mathcal{L}_m'' = \left(\frac{4}{3}\right)^2 \cdot 0{,}3\,mH = 0{,}533\,mH$