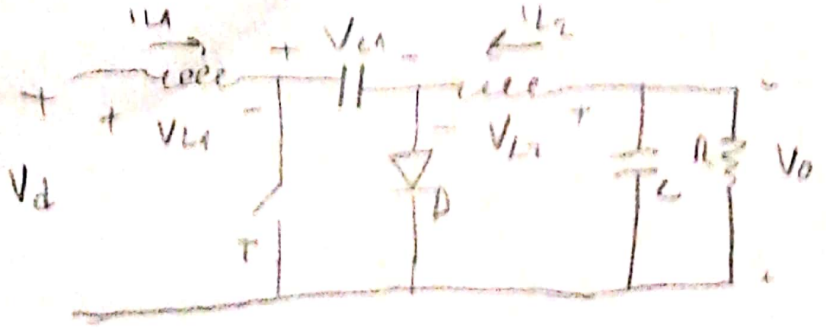
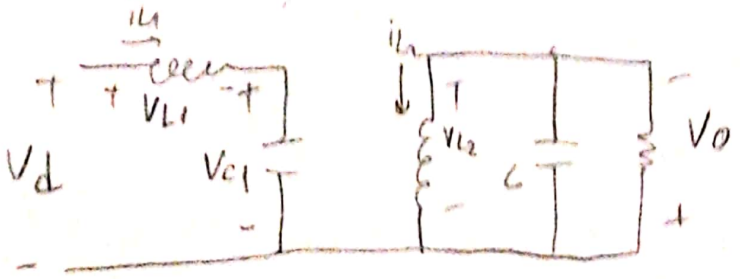
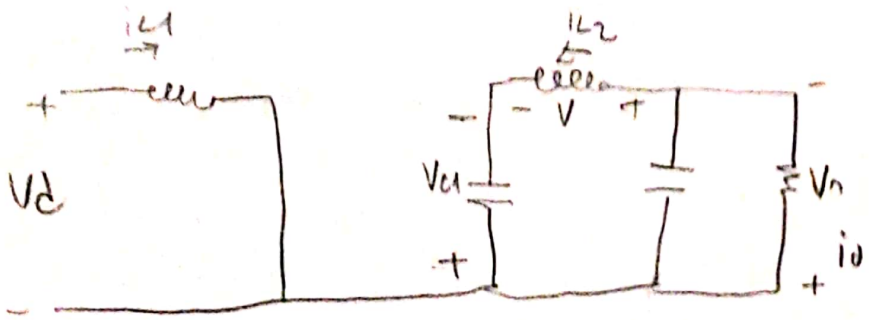


Switch OFF:



Switch ON:



assume i_o = const

$i_o = i_{L2} = i_{c1} \Rightarrow V_{L2}$ = const

$$i_{c1} = C_1 \frac{dV_{c1}}{dt}$$

$$\frac{dV_{c1}}{dt} = \frac{\Delta V_o \cdot t}{D}$$

in our problem:

$$\frac{V_o}{V_d} = \frac{12}{9} = \frac{D}{1-D} \Rightarrow D = \frac{4}{7}$$

$$i_{c1} = C_1 \cdot \frac{\Delta V_o t}{D}$$

we picked C_1 as 72μF, $\Rightarrow 3 = 72.10^{-6} \cdot \Delta V_o \cdot \frac{100000}{\frac{4}{7}}$

$$\Rightarrow \Delta V_o = 0,23 V \simeq \%0,148$$

in the simulation, $\Delta V = 0,027$ V

Assume $V_o = 12V$ const. from our simulation, $\Delta I_o = 0,4mA$

when switch is off:

$$V_{L2} = V_o$$

$$V_{L2} = L_2 \frac{di_{L2}}{dt} \rightarrow \frac{di_{L2}}{dt} = \frac{\Delta I_o \cdot f}{D} \Rightarrow V_{L2} = L_2 \frac{\Delta I_o \cdot f}{D}$$

in our case: $L_2 = 220\mu H$

$$\Rightarrow 12 = 220 \times 10^{-6} \times \frac{\Delta I_o}{\frac{4}{7}} \cdot 100000 \Rightarrow \Delta I_o = 0,311 \approx \%10$$

in our simulation, $\Delta I_o = 0,007A$