# Exercise 1

The voltages and current in the boost converter of figure 1 are $U_d = 12\text{V}$, $U_o = 24\text{V}$, $I_o = 1\text{A}$ and the value of the components are $L = 150\mu\text{H}$, $C = 470\mu\text{F}$ and the switching frequency is $f_s = 20\text{kHz}$. Calculate the variation in the output voltage $\Delta U_o$.

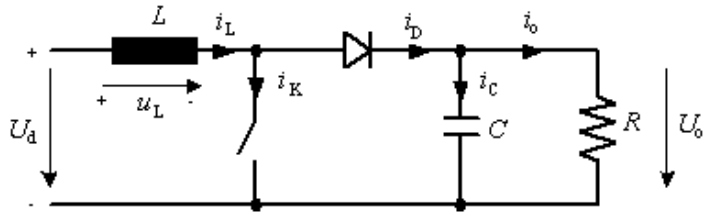


Figure 1: Boost converter.

# Exercise 2

The voltages and current in the boost converter of figure 1 are $U_d = 12\text{V}$, $U_o = 24\text{V}$, $I_o = 1\text{A}$ with a capacitor of $C = 470\mu\text{F}$ and a switching frequency of $f_s = 20\text{kHz}$. Calculate the choke peak current $i_{L,peak}$, which is also the peak value of the switch current $i_{K,peak}$,

a) when the choke value is $L = 150\mu\text{H}$. What happens is the value of the choke is higher?

b) when the choke value is $L = 50\mu\text{H}$.

Calculate the ratio of the peak current of the choke with its average values, i.e. $i_{L,peak}/I_L$, as a function of $L_{oB}/L$. $L_{oB}$ the minimal value of the choke $L$ to keep the circuit working in the continuous conduction mode (CCM).

# Exercise 3

Using figure 1, calculate the rms-value of the current $i_D$ (figure 2) which is also the current in capacitor $C$, $i_C$, rms-value. The characteristic of the circuit are:
$8 \leq U_d \leq 16\text{V}$, $U_o = 24\text{V}$, $I_o = 1\text{A}$, the output power $P_o \geq 5\text{W}$, $C = 470\mu\text{F}$, $L = 427\mu\text{H}$, $f_s = 20\text{kHz}$ and the duty ratio $D = 0,5$.

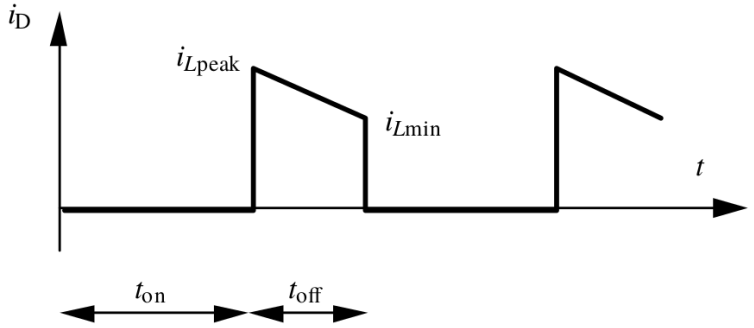


Figure 2: Diode current $i_D(t)$.