

Exercise N° :1

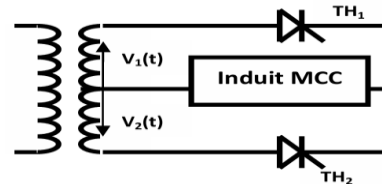
Consider the following rectifier circuit (controlled P2) such that it supplies the armature of a direct current motor. Knowing that

$$V_1(t) = V_m \sin \omega t, V_2(t) = V_m \sin (\omega t - \pi), E = 60 \text{ [V]}, R = 6 \text{ } [\Omega], \alpha = \pi/3 \text{ [rd]}, L \rightarrow \infty$$

$$E < V_m, \alpha > \psi$$

1. Draw: $V_{ch}(t)$; $I_{ch}(t)$; $V_{invTH1}(t)$; $I_{TH1}(t)$;

$$I_{TH2}(t)$$



If the current I_{TH1} is equal to 5 [A] in RMS value, calculate the average load voltage, as well as the voltages $V_1(t)$ and $V_2(t)$

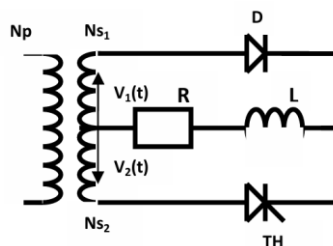
Exercise N° :2

Consider the two-phase rectifier Such that

$$V_1(t) = 220 \sin \omega t \text{ [V]}, f = 50 \text{ [Hz]}$$

It supplies an RL load such that the value of the inductance is large enough ($L \rightarrow \infty$) to assume that the load current is constant. We assume the transformer has a ratio of 1 ($N_p = N_{s1} = N_{s2}$)

1. Draw the waveforms of $V_{ch}(t)$, $I_{ch}(t)$, $V_{TH}(t)$, the secondary currents $I_{s1}(t)$, $I_{s2}(t)$, as well as the primary current $I(t)$ of the transformer
2. Assuming the average load current is 10 [A] and the average load power is 1500 [W], calculate in this case the thyristor firing delay angle



Exercise N° :3

Consider a controlled single-phase Graëtz bridge rectifier, supplying an RL load such that $R = 10 \text{ } [\Omega]$.

The firing delay angle for the thyristors is $\alpha = \pi/3 \text{ [rad]}$, and the supply voltage on the primary side is $V_1(t) = 311 \sin 100 \pi t \text{ [V]}$.

The rectifier elements are perfect, and the transformer has a ratio of $m = 0.5$.

1. Draw the circuit diagram and sketch the waveforms of $V_{ch}(t)$, $I_{ch}(t)$, $V_{TH1}(t)$.
2. Calculate the average value of the load current and the average current in one thyristor for the following cases: " $L = 0$ et si $L \rightarrow \infty$ "