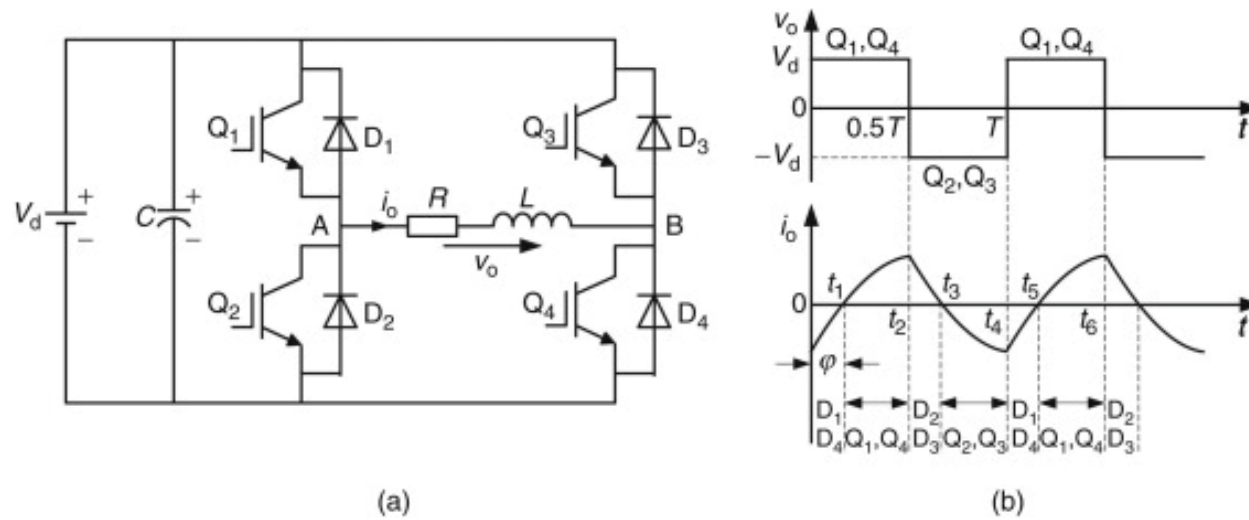
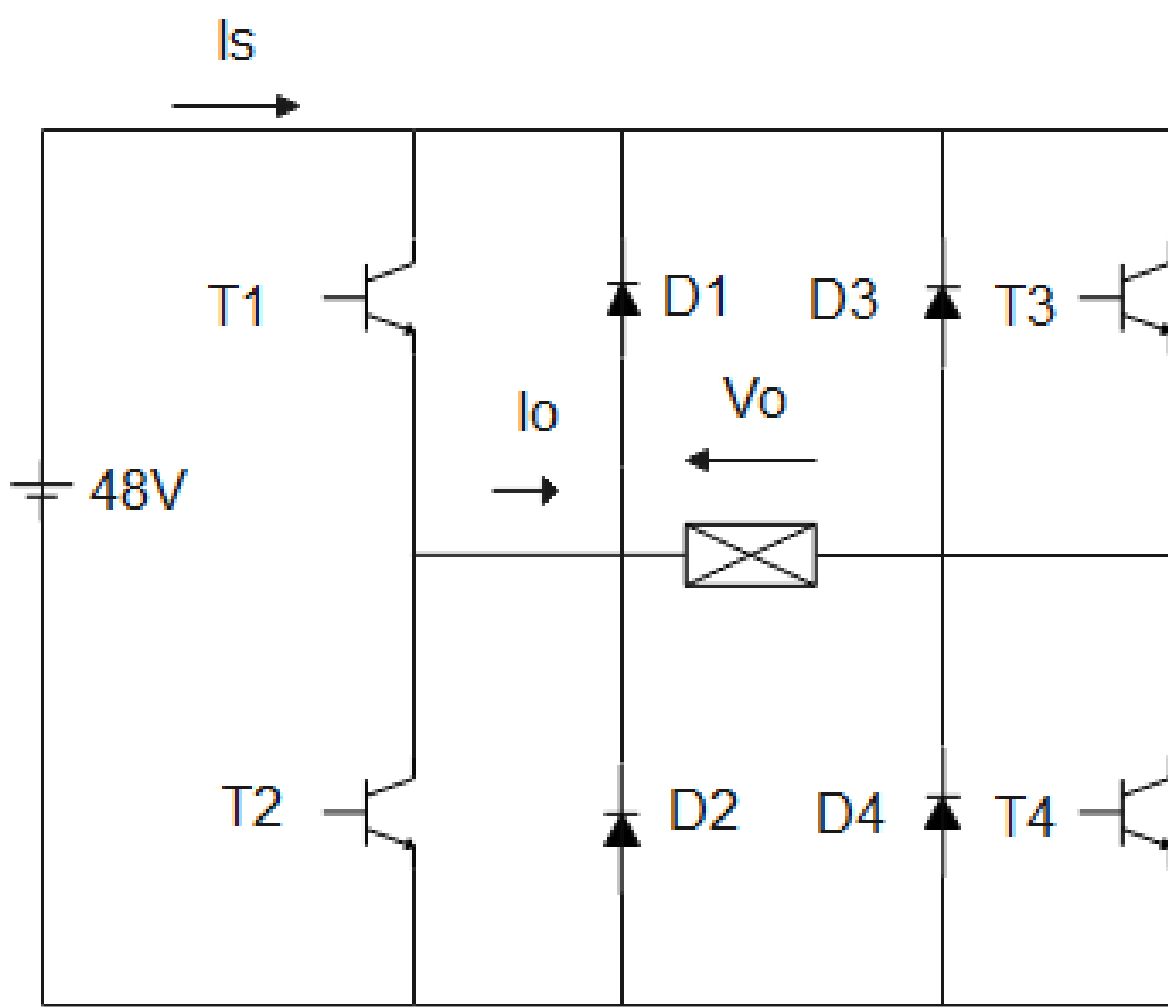


Exercise 35

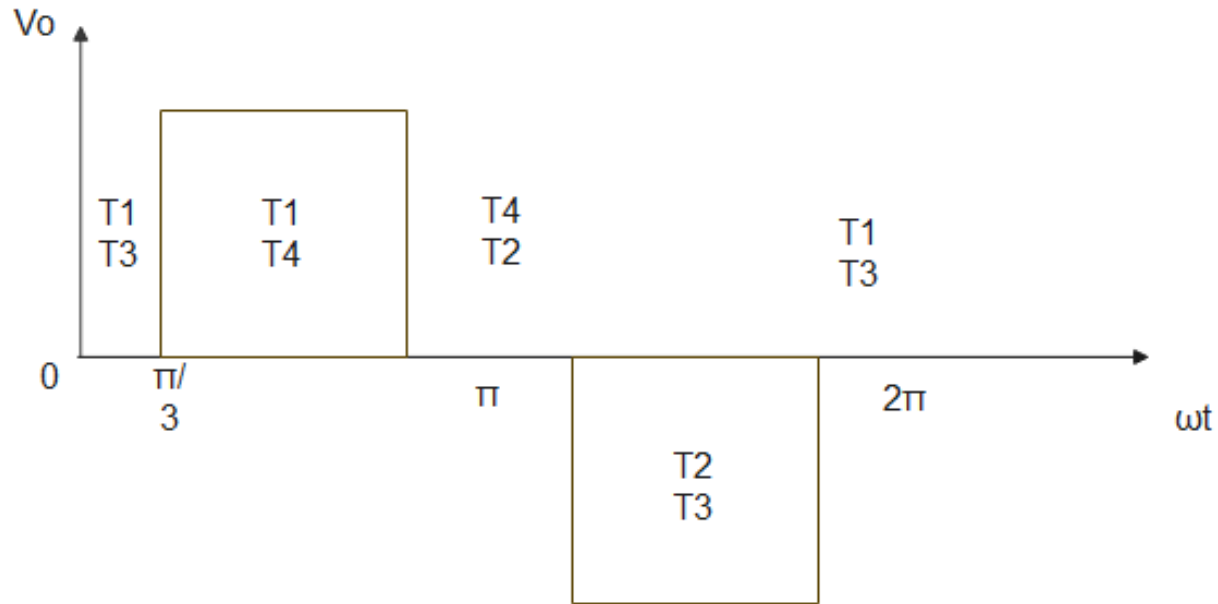


Analysis of power electronics/inverters

Athanasia Kontidou/Michael Fragiadakis



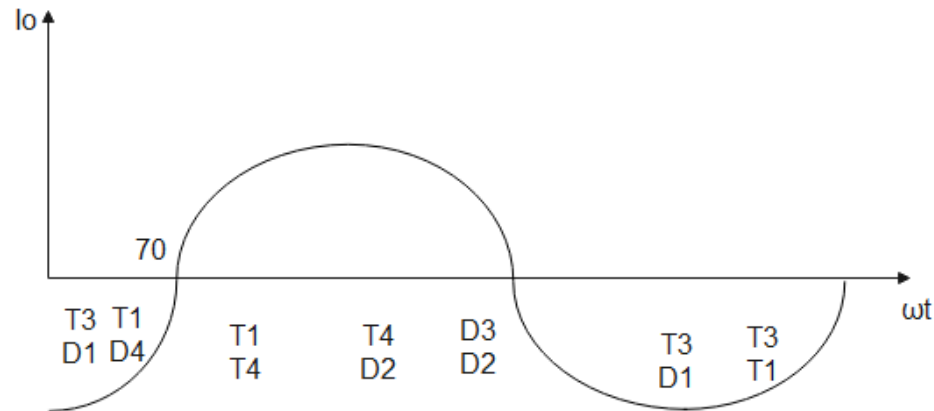
OUTPUT VOLTAGE



The output voltage is a rectangular pulse of 60 degrees amplitude from $\pi/3$ to $2\pi/3$ and from $4\pi/3$ to $5\pi/3$.

- $0 - \pi/3$: conduction of T1, T3 so $V_o = V_a - V_b = 0$
- $\pi/3 - 2\pi/3$: conduction of T1, T4 so $V_o = V_a - (-V_b) = V - 0 = V$
- $2\pi/3 - 4\pi/3$: conduction of T2, T4 so $V_o = -V_a - (-V_b) = 0$
- $4\pi/3 - 5\pi/3$: conduction of T2, T3 so $V_o = -V_a - V_b = V - 0 = -V$
- $5\pi/3 - 2\pi$: conduction of T1, T3 so $V_o = V_a - V_b = 0$

OUTPUT CURRENT



From the information given the output current is sinusoidal with a current delay of 70 degrees from the first harmonic of voltage output.

S1 : We have zero output voltage and negative output

current. So, conduction of D1, T3 and no electricity transmission.

S2: We have positive voltage and negative current. So, conduction of D1, D4 and electricity transmission from load to source .

S3: We have positive voltage and positive current. So, conduction of T1 T 4 and electricity transmission from source to load .

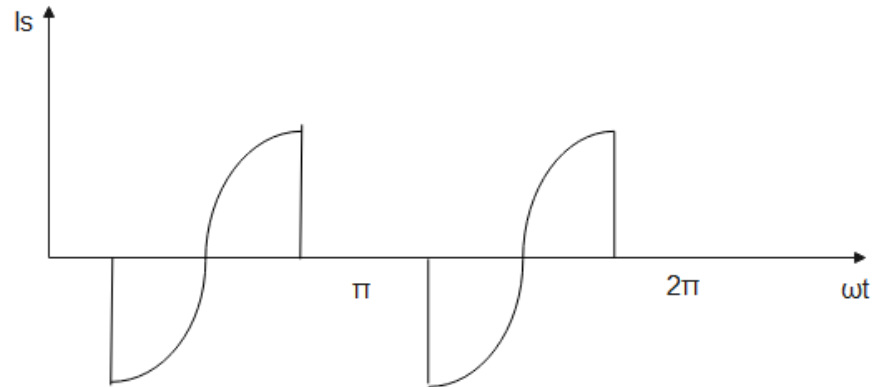
S4: We have zero output voltage and positive output

current. . So, conduction of D1, T3 and no electricity transmission.

OUTPUT CURRENT

- S5: We have negative voltage and positive current. So, conduction of D2 D3 and electricity transmission from load to source
- S6: We have negative voltage and negative current. So, conduction of T2 T3 and electricity transmission from source to load .
- S7: We have zero output voltage and negative output current. So, conduction of T3 D1 and we have no electricity transmission

INPUT CURRENT

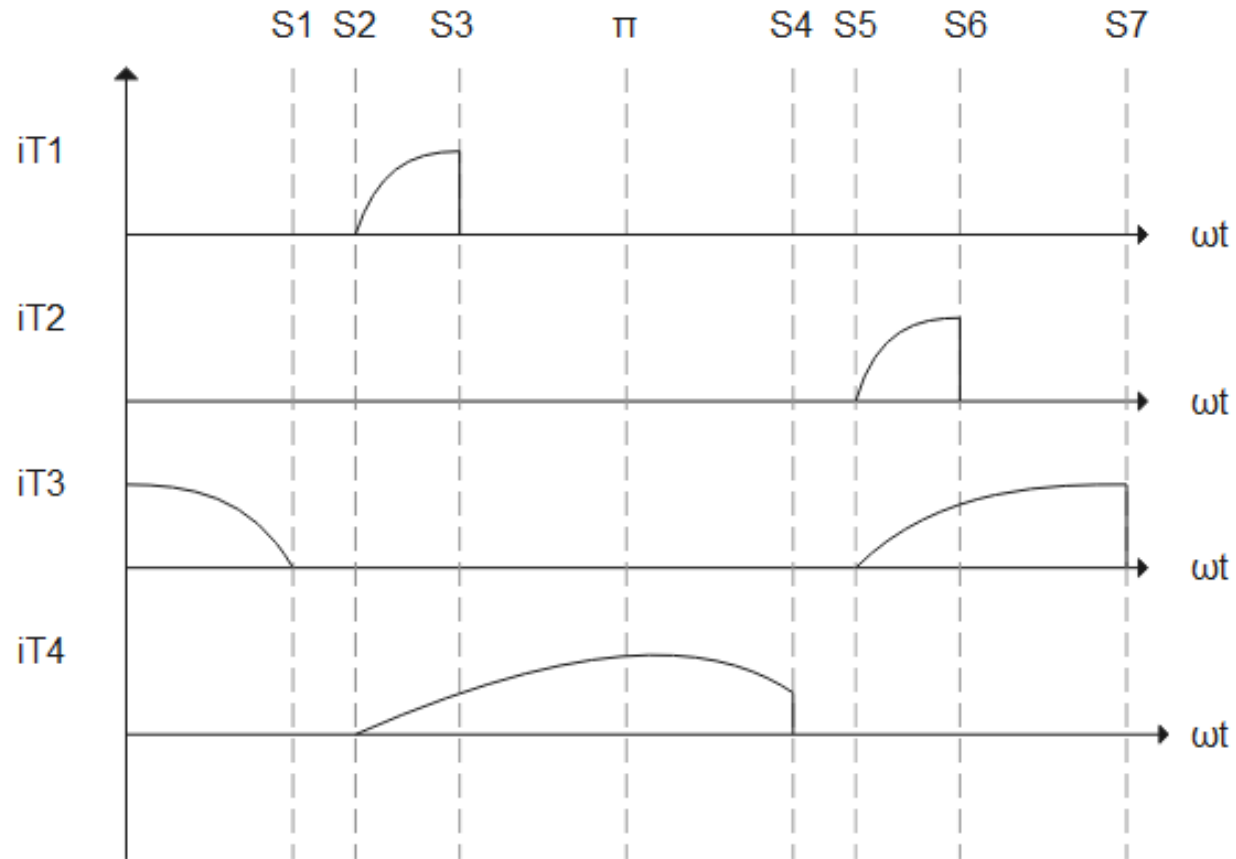


From S_1, S_4, S_7 we have zero output current, every transistor is open and we have no electricity transmission from the source or the load.
From S_2, S_5 we have electricity transmission from load to source.
So, we have negative polarity in the load.
From S_3, S_6 we have electricity transmission from source to load.
So, we have positive polarity in the load.

TRANSISTOR /DIODE CURRENTS

- Every current value is positive due to the unique polarity of the semiconductor switches.
- From the output current diagram we have the time period of every transistor and diode

TRANSISTOR CURRENTS



DIODE CURRENTS

