

4.5 EFFECT OF SOURCE INDUCTANCE

In actual practice, the converter is connected to ac mains through a transformer.

In a converter, because of source inductance, the current in the outgoing thyristor cannot change from full value to zero instantaneously and the current through the incoming thyristor cannot increase from zero to full value instantaneously. Therefore after the triggering gate pulse is applied to a thyristor, the current of the outgoing thyristor decreases from full value to zero over a time $\omega t = \mu$. During this time interval the current through incoming thyristor rises from zero to full value. During this period μ known as commutating period, both the outgoing and incoming thyristors are conducting. μ is also known as overlap angle. The overlapping of currents causes a reduction in output voltage. During this commutation period, the output voltage is equal to 0.

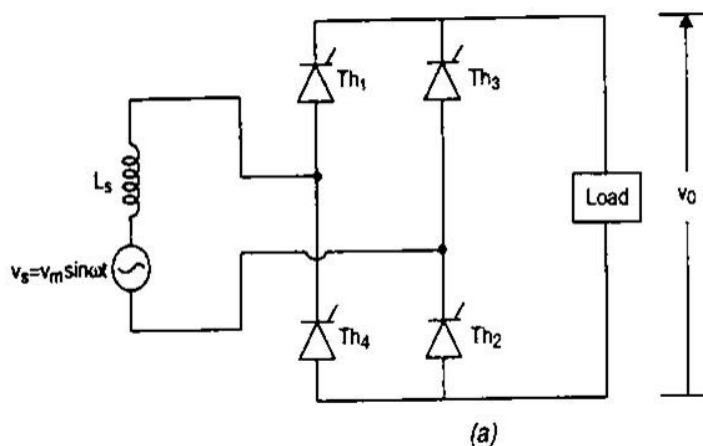


Figure 4.5.1 Single Phase Converter with Source Inductance

[Source: "Power Electronics" by P.S.Bimbra, Khanna Publishers Page: 222]

Figure shows a single phase fully controlled bridge converter with source inductance L_s . The load is assumed to be highly inductive so that load current can be assumed to be constant and equal to I_0 . Let i_1 and i_2 be the currents through Th_1, Th_2 combination and Th_3, Th_4 combination respectively.

During overlap period μ one of these currents decays to zero and the other builds up from zero to full value. Four thyristors conduct together as shown in Fig

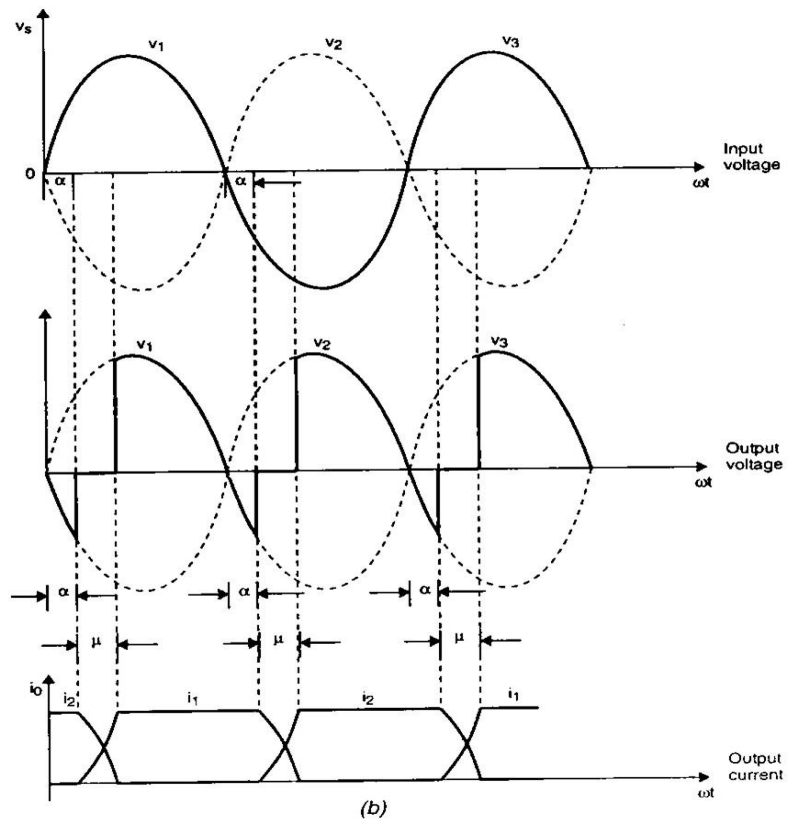


Figure 4.5.2 Effect of Source Inductance

[Source: "Power Electronics" by P.S.Bimbra, Khanna Publishers Page: 223]