Inverter Operation Modes

Two inverter operation modes are established depending on the thyristor firing angle:

1) Load-commutated inverter

   Applies when $\pi/2<\alpha<\pi$.

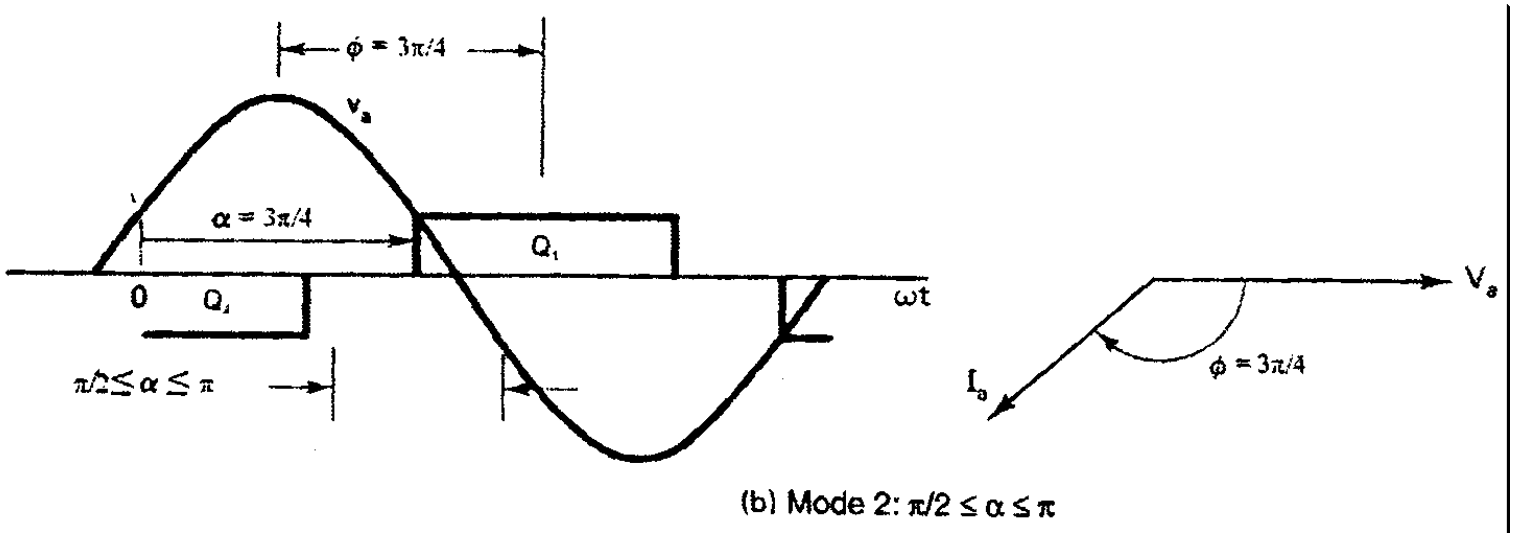
2) Force-commutated inverter

   Applies when $\pi<\alpha<3\pi/2$.

Load-Commutated Inverter Mode

Consider $\alpha=3\pi/4$. In this case $v_{ca} < 0$ => thyristor Q_5 is turned off by the load. This requires load to operate at leading power factor => motoring mode of a synchronous machine operating in over-excitation.

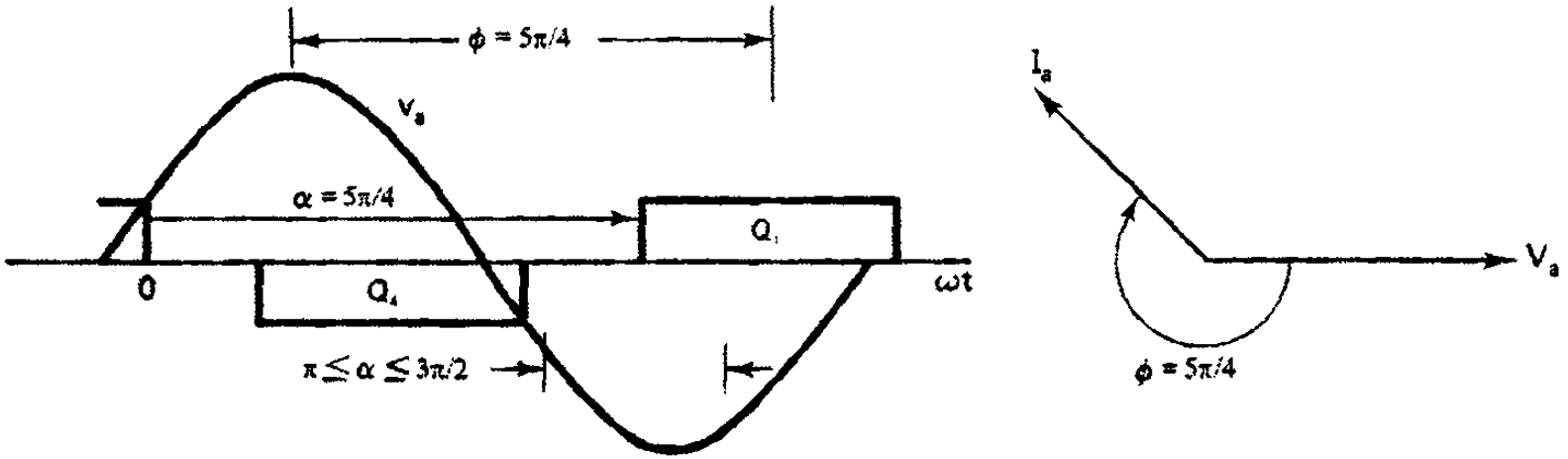
$$V_d=-V_{d0}\cos\alpha$$



(b) Mode 2: $\pi/2 \le \alpha \le \pi$

Force-Commutated Inverter Mode

Consider $\alpha=5\pi/4$. In this case $v_{ca}> 0$ and so thyristor Q_5 is not turned off by the load. Thus some type of forced commutation is required in this case. Lagging VAR is consumed by the load => motoring mode of an induction motor. $V_d=-V_{d0}\cos\alpha$



(c) Mode 3: $\pi \le \alpha \le 3\pi/2$