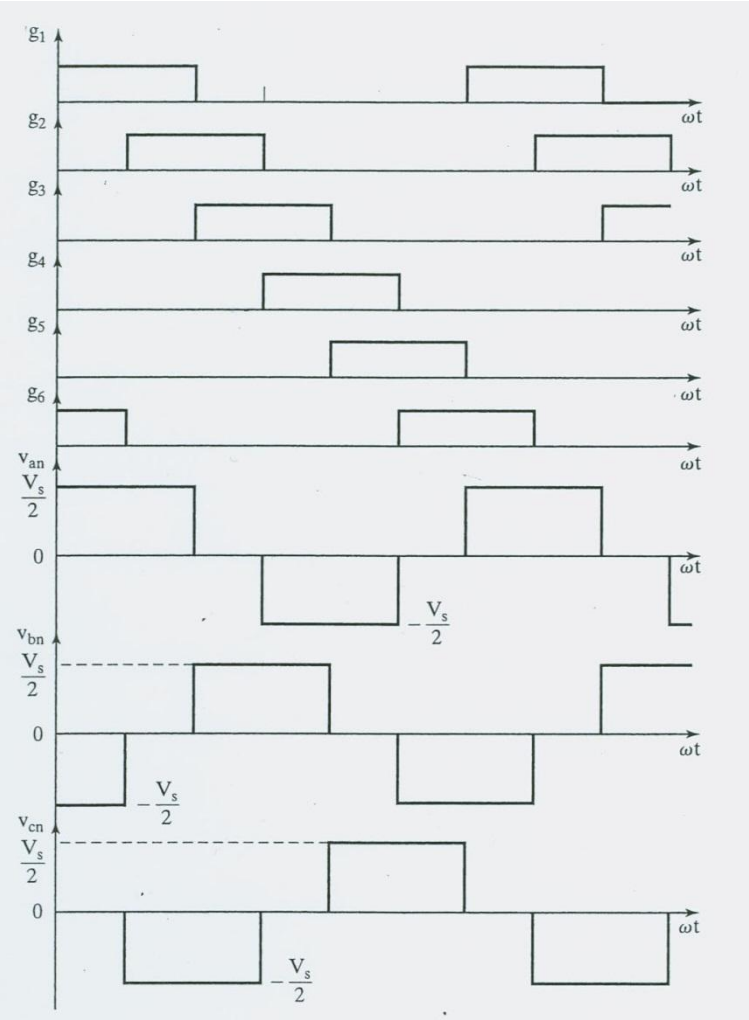
# SELF-COMMUTATION INVERTERS

- For 120 degrees operation, each transistor conducts for 120 degrees

- The sequence of firing is: 61, 12, 23, 34, 45, 56, 61

# SELF-COMMUTATION INVERTERS

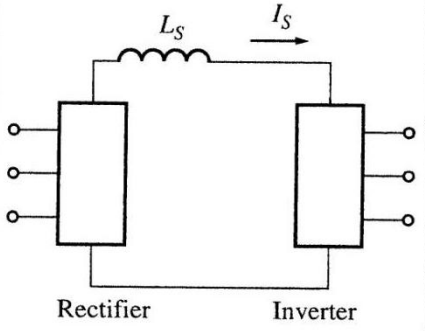
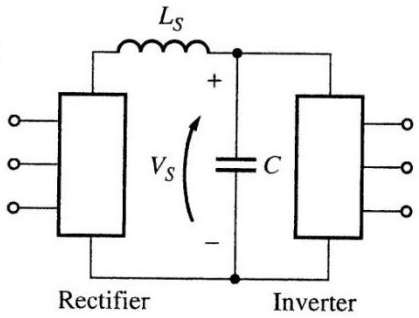
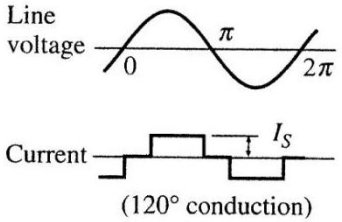
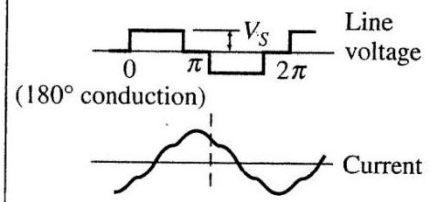


# SELF-COMMUTATION INVERTERS

- Current source inverters and voltage source inverters are different from PWM inverters and have been used for a long time

- PWM inverters require more complex control circuitry and faster switching components than CSI and VSI

# SELF-COMMUTATION INVERTERS

| | Current source inverter | Voltage source inverter |
|---|---|---|
| Main circuit configuration |  |  |
| Type of source | Current source $-I_S$ almost constant | Voltage source $-V_S$ almost constant |
| Output impedance | High | Low |
| Output waveform |  |  |
| Characteristics | 1. Easy to control overcurrent conditions with this design<br>2. Output voltage varies widely with changes in load | 1. Difficult to limit current because of capacitor<br>2. Output voltage variations small because of capacitor |

# SELF-COMMUTATION INVERTERS

- In the current source inverter, a rectifier is connected to an inverter through a large series inductor $L_S$

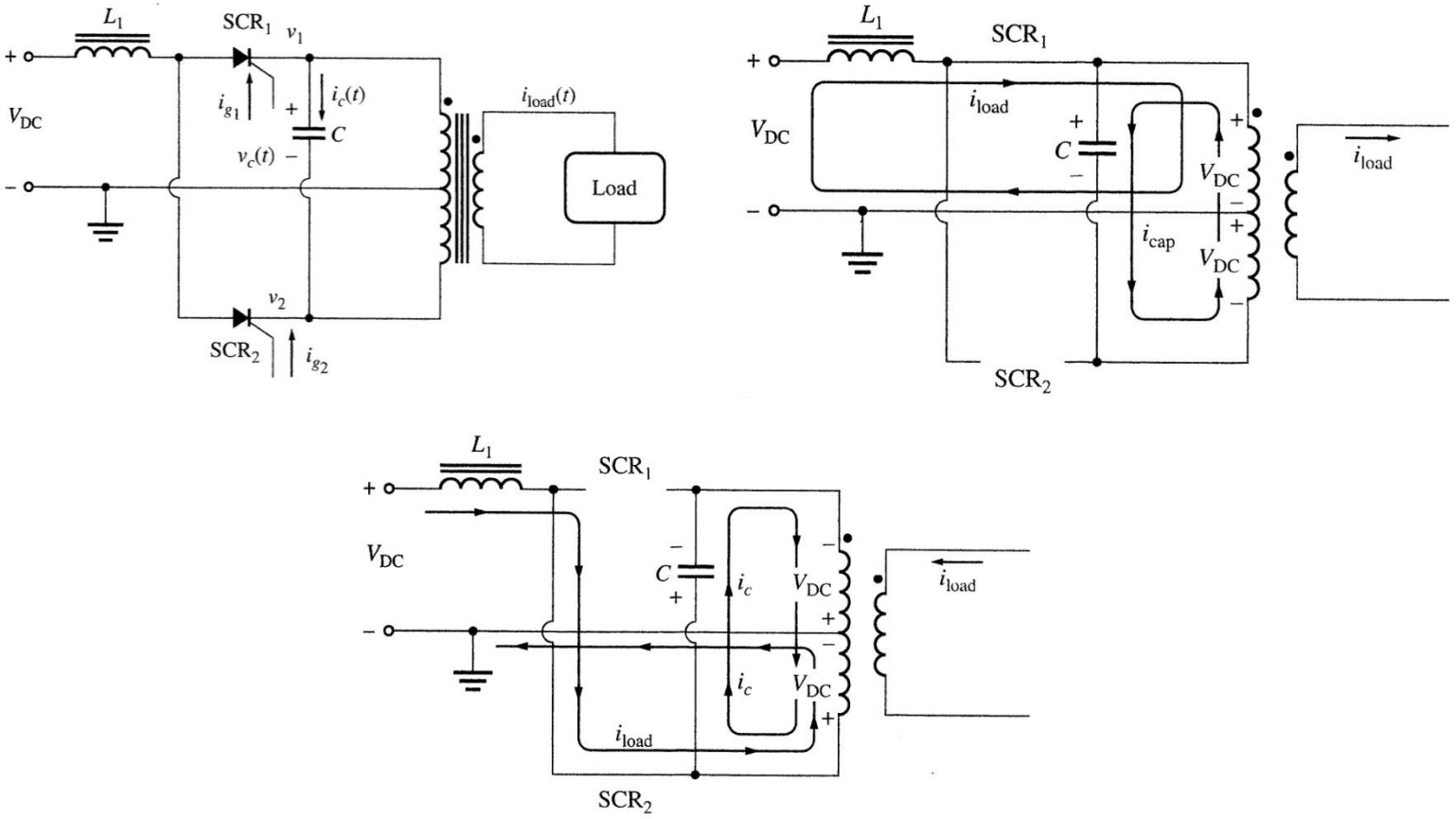
- The inductance of $L_S$ is sufficiently large that the dc current I constrained to be almost constant

# SELF-COMMUTATIION INVERTERS

- The SCR current output waveform will be roughly a square wave since $I_S$ is constrained to be nearly constant
- The line-to-line voltage will be triangular
- It is easy to limit overcurrent conditions in this design, but the output voltage can swing widely in response to changes in load

# SINGLE-PHASE CURRENT SOURCE INVERTER

- A single-phase CSI circuit with capacitor commutation is shown below



# SINGLE-PHASE VOLTAGE SOURCE INVERTER

- In the voltage source inverter, a rectifier is connected to an inverter through a series inductor $L_S$ and a parallel capacitor C

- The capacitance of C is sufficiently large that the voltage is constrained to be almost constant

# SINGLE-PHASE VOLTAGE SOURCE INVERTER

- The SCR line-to-line voltage output waveform will be roughly a square wave, since the voltage $V_c$ is constrained to be nearly constant

- The output current flow will be approximately triangular

# SINGLE-PHASE VOLTAGE SOURCE INVERTER

- Voltage variations are small in this circuit, but currents can vary wildly with variations in load, and overcurrent protection is difficult to implement

- The frequency of both current and voltage source inverters can be easily changed by changing the firing pulses on the gates of the SCRs, so both inverters can be used to drive ac motors at variable speeds