**Homework4**

**4.3** What’s the meaning of Voltage Source Inverter (VSI)? What’s the meaning of Current Source Inverter (CSI)? And what are the characteristics

of VSI and CSI?

“inverter” is referred as a circuit that operates from a DC source and generates AC output. If the input dc is a voltage source, the inverter is called a voltage source inverter (VSI). One can similarly act as a current source inverter (CSI), where the input to the circuit is a current source. The VSI circuit has direct control over “output (ac) voltage” whereas the CSI directly controls “output (ac) current”.

Shape of voltage waveforms output by an ideal VSI should be independent of load connected at the output.

The characteristics of VSI:

1. There is no pulse in DC side voltage because of the DC voltage source or large capacity.
2. The waveform in AC side is almost rectangle and has no relation with Load impedance angle.

The characteristics of CSI:

1. There is no pulse in DC side current because of the DC current source or large inductor.
2. The IGBT in CSI is used to change the path where the current can flow and the waveform is like rectangle.

**4.4** What’s the function of Feedback Diode (Also called Freewheeling Diode) in VSI? And why doesn’t CSI have Feedback Diode?

In VSI, in the interval of the change of the two arms of the bridge or full bridge there is a feedback diode to make sure that the current on the load can continue to flow and wait for the change. And the feedback diode can let the current go to protect inverter from destroyed.

But in CSI, the current can change direction by control the IGBT and it doesn’t need to feedback diode to make the current flow back as usual.

**4.5** To a three-phase bridge VSI which is operating in 180° conduction mode, Ud=100V.

①. Compute the amplitude UUN1m and RMS value UUN1 of fundamental output phase voltage.





②. Compute the amplitude UUV1m and RMS value UUV1 of fundamental output line voltage.





③. Compute the RMS value UUV5 of 5th harmonic wave of output line voltage.

