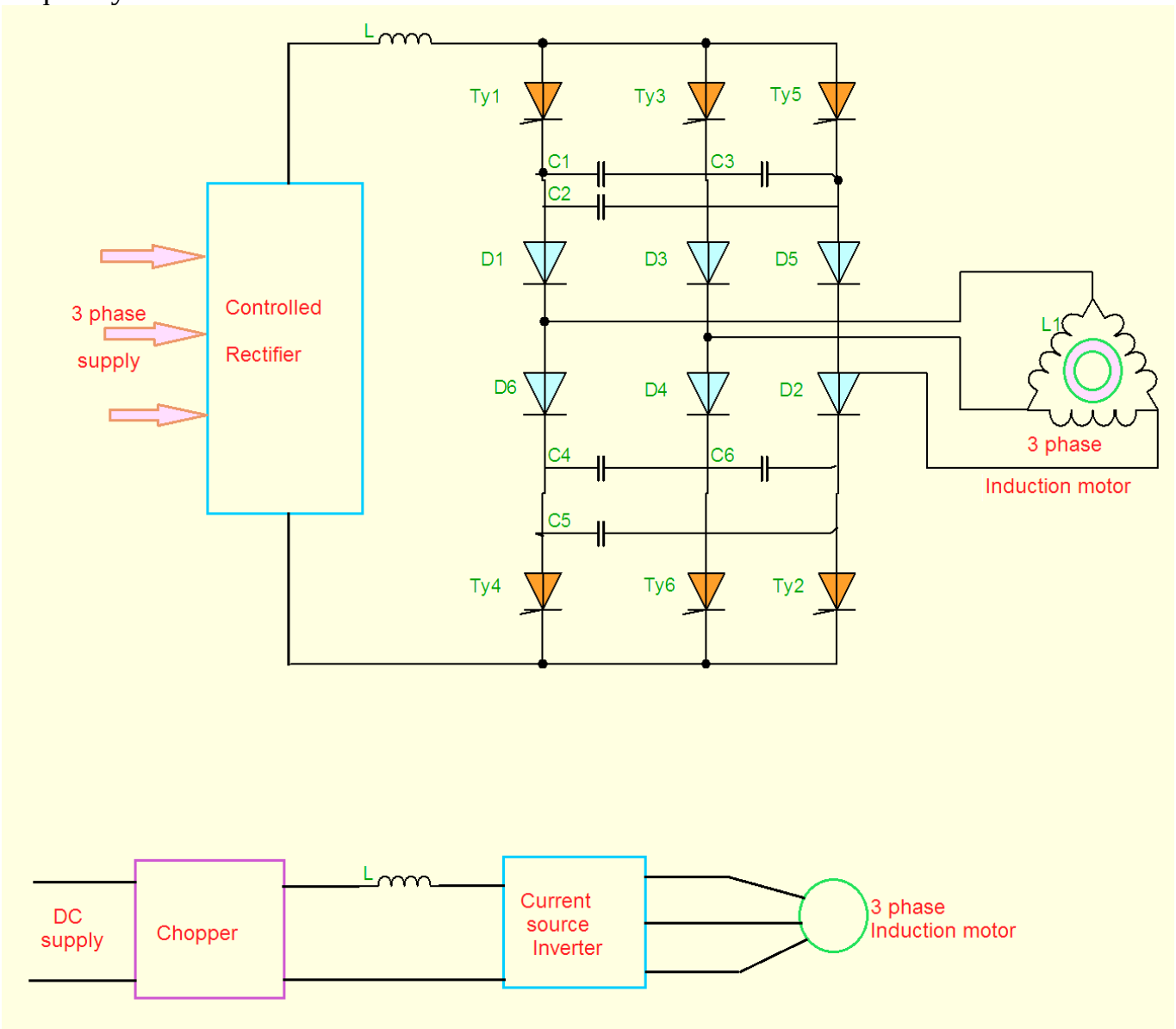
Subject : Electric Drives & Traction
Topic : CSI fed Induction Motor Drive

CSI (Current Source Inverter)

CSI is used in many applications due to its flexibility, reliability and commutation. CSI operates on closed loop and capable of generation, by using CSI variable frequency is obtained.



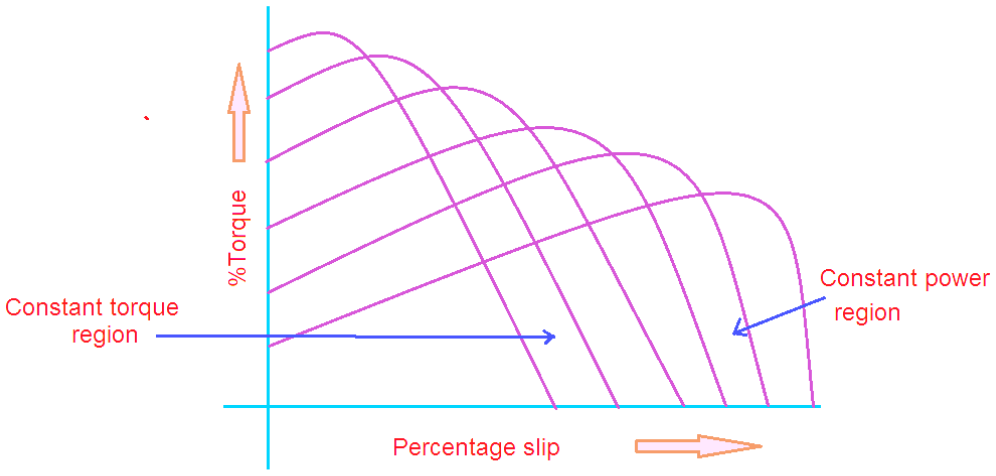
The variable frequency control of an induction motor can also be obtained using CSI. The inductor is connected in series with the input.

* By varying the thyristors conduction periods and Inverter, the DC current is converted into a three phase current source.
* The stator current is a function of rotor frequency, by keeping flux constant the magnitude of stator is controlled by the rotor frequency.
* When supply is AC the controlled rectifier converts it into variable DC, if the supply is DC the chopper manages the circuit.
* From the circuit diagram for commutation of six thyristors the circuit is provided with six diodes and six capacitors.
* The six thyristors are triggered with a phase difference of 180°. The diodes are used for preventing discharge of capacitors through load.

Characteristics:

*For below rated speed, motor operates at constant flux mode.
*For above rated speed, motor operates at field weakening mode.
*For speed equal to rated speed, the voltage reach its rated value and no further increase of speed.

The characteristics are shown below on taking percentage slip on x-axis and percentage torque on y-axis.



Advantages:

1. CSI is robust and simple
2. Four quadrant operation is possible
3. Controlling the speed in simple way
4. Better controlled performance.

Disadvantages:

1. Cost is expensive with PWM technique
2. Unsupported for multi-motor operation
3. CSI not used in open loop control drives
4. Undesirable dynamic performance
5. At no-load condition it is difficult to operate.