3.5 Closed-loop control of induction motor

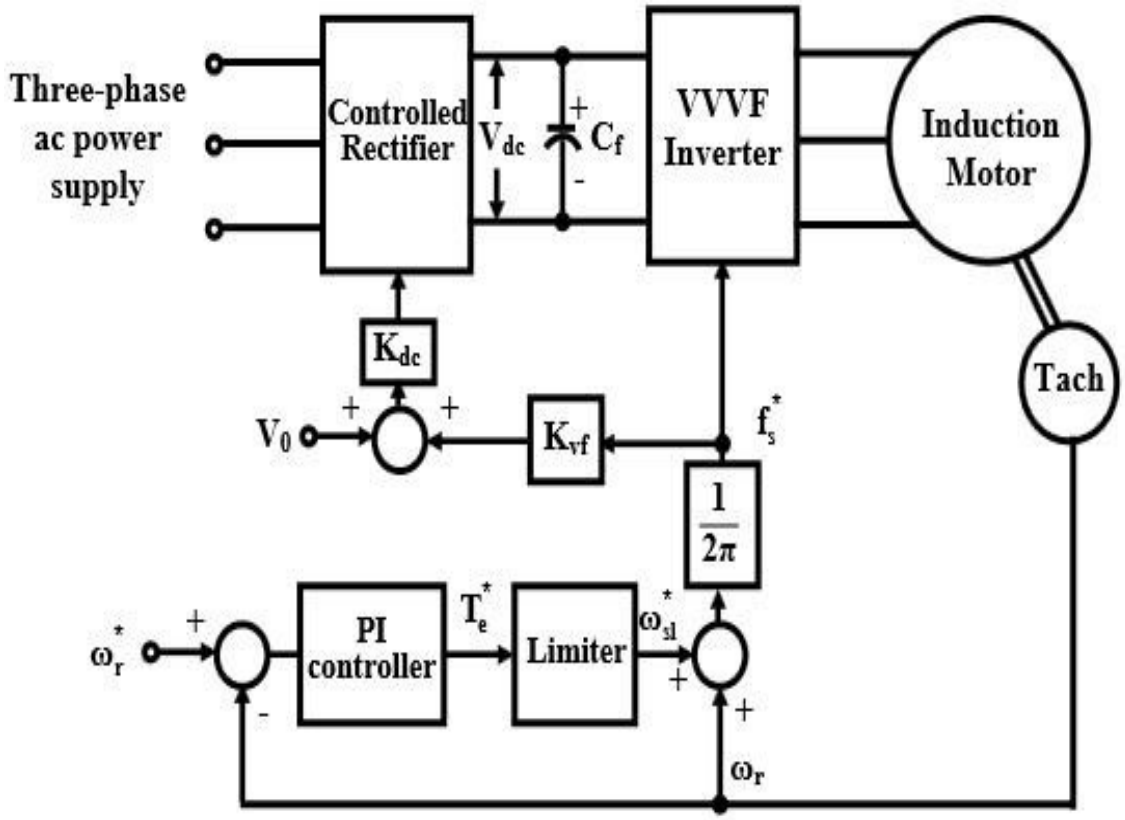

Fig 3.5.1 Closed-loop induction motor drive with constant volts/Hz control strategy

(Source:"Fundamentals of Electrical Drives" by G.K.Dubey,page-198)

An outer speed PI control loop in the induction motor drive, shown in Figure computes the frequency and voltage set points for the inverter and the converter respectively. The limiter ensures that the slip-speed command is within the maximum allowable slip speed of the induction motor. The slip- speed command is added to electrical rotor speed to obtain the stator frequency command. Thereafter, the stator frequency command is processed in an open-loop drive. K_{dc} is the constant of proportionality between the dc load voltage and the stator frequency.

Constant air gap flux control:

1. Equivalent separately-excited dc motor in terms of its speed but not in terms of decoupling of flux and torque channel.
2. Constant air gar flux linkages

$$\lambda_m = L_m i_m = E_1/G\omega_s$$

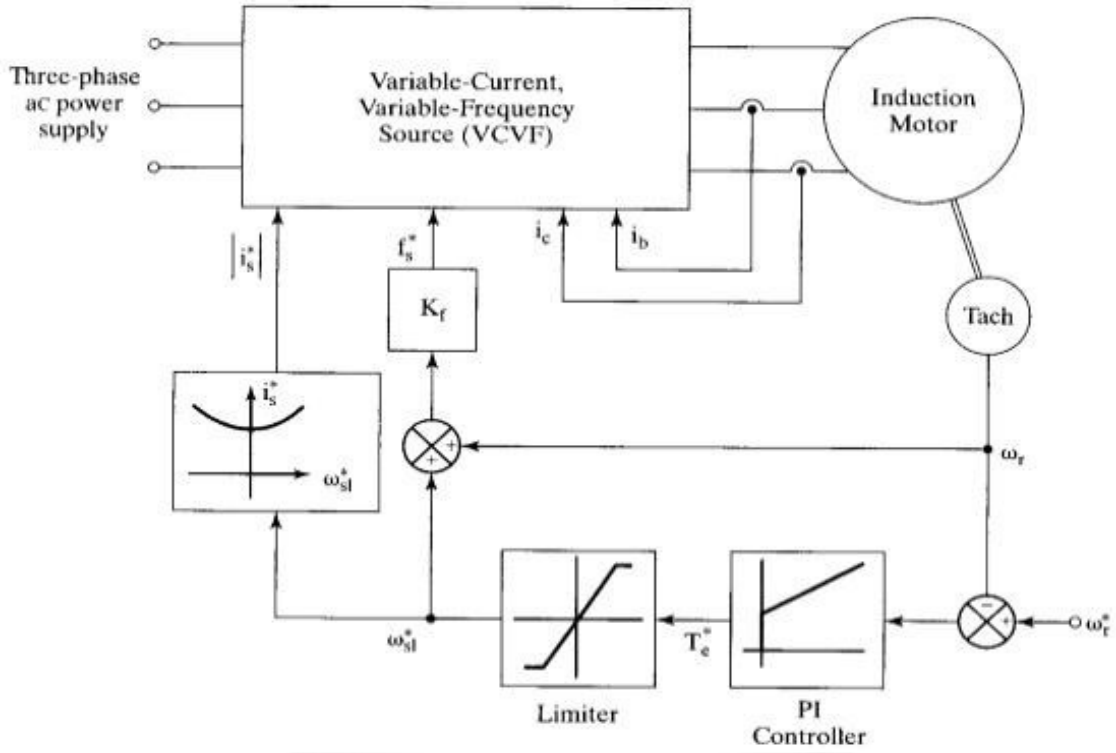

Fig 3.5.2 Closed-loop VCVF Control

(Source:"Fundamentals of Electrical Drives" by G.K.Dubey,page-208)

The rotor flux magnitude and position is key information for the AC induction motor control. With the rotor magnetic flux, the rotational coordinate system (d-q) can be established. There are several methods for obtaining the rotor magnetic flux. The implemented flux model utilizes monitored rotor speed and statorvoltages and currents. It is calculated in the stationary reference frame (α,β) attached to the stator. The errorin the calculated value of the rotor flux, influenced by the changes in temperature, is negligible for this rotor flux model.