The power supply generates a rotating magnetic flux whose angular speed (*synchronous speed*) is given by the following general formula:

$$RPM = \frac{2 f 60}{p}$$

where f is the three-phase frequency and p is the number of poles (in Figure 6, p=2).

If the rotor angular speed is different from the synchronous speed, a flux density derivative will appear in the rotor windings, which in turn will generate a current on those windings because they are shorted.

In the case of a counter-clockwise rotation of the stator flux, the currents in the rotor conductors are shown in Figure 7. The currents in the rotor generate a rotor flux density.

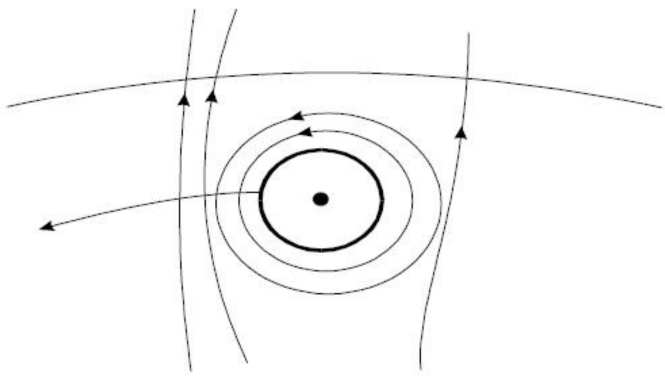

Figure 7: *Stator and flux lines around a rotor conductor.*

Above figure shows the local interaction between stator and rotor flux density around a rotor winding: the rotor flux tends to increase the total magnetic flux in the right side of the conductor, while decreases the total magnetic flux in the left side.

The net consequence on the conductor is a force directed towards left. Similar effects happen in the other rotor windings and this causes an electromagnetic torque on the rotor, which starts to rotate.

The greater the speed of the rotating magnetic field produced by the stator relative to the speed of the rotor windings, the greater the voltage produced in the rotor windings.

If rotor speed becomes the same as the speed of the stator's rotating magnetic field, (i.e. synchronous speed), no voltage and consequently no torque is produced by the rotor. Because of friction, the rotor cannot continue to rotate at synchronous speed.

Rotor speed must then fall below synchronous speed until the voltage and torque produced balance the rotor losses and any load on the motor shaft.

The amount by which rotor speed and the speed of the rotating magnetic field produced by the stator differ is called slip.

Slip, usually expressed as a percentage of the synchronous speed, is closely proportional to motor torque over a limited range.

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