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FACULTY OF ENGINEERING & TECHNOLOGY

Electrical Machine-ii

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Starting Principle

A single phase induction motor consists of a single phase winding on the stator and a cage winding on the rotor. When a 1 phase supply is connected to the stator winding, a pulsating magnetic field is produced. In the pulsating field, the rotor does not rotate due to inertia. Therefore a single phase induction motor is not self-starting and requires some particular starting means. Two theories have been suggested to find the performance of a single phase induction motor.

1. Double revolving field theory.
2. Cross-field theory.

Double revolving field theory

his theory for single phase states that a stationary pulsating magnetic field can be resolved into two RMF, each of equal magnitude but rotating in the opposite direction.
The induction machine responds to each magnetic field separately, and the net torque in the motor is equal to some of the torque due to each of the two magnetic fields.
The equation for an alternating magnetic field whose axis is fixed in space is given by:

$$b(\alpha) = \beta_{max} \sin \omega t \cos \alpha$$

$$b(\alpha) = \frac{1}{2}\beta_{max} \sin(\omega t - \alpha) + \frac{1}{2}\beta_{max} \sin(\omega t + \alpha)$$

β_{max} is the maximum value of sinusoidally distributed air gap flux density. 'B' represents the equation of revolving field moving in the positive α direction, and 'A' represent equation of revolving field moving in a positive direction. The field moving in the positive α direction is called the forward rotating field and in negative α direction is called the backward rotating field.

Double revolving field theory (Conti..)

It is therefore concluded that a stationary pulsating magnetic field can be resolved due to two rotating magnetic fields both of equal magnitude and moving at synchronous speed in the opposite direction at the same frequency as the stationary magnetic field.

The theory based on such a resolution of an alternating field into two counter-rotating fields is called the **Double revolving** field theory of single phase induction machine.