



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

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Approved by AICTE, New Delhi, Recognized by UGC & Affiliated by Anna University, Chennai
Coimbatore-641035

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

19EET301 / POWER ELECTRONICS AND DRIVES

III YEAR / V SEMESTER

UNIT – V : AC MOTOR DRIVES



BASICS OF AC DRIVE



TOPIC OUTLINE

What we'll discuss?

AC drive – Advantages

AC drive – Limitations

AC – Induction motor: Parts / Types

Principle of Operation of Induction Motor

Speed Torque characteristics

Speed Torque relations

Methods of Speed control





AC DRIVE

Advantages / Limitations

Electric drives that use AC motors as the prime mover

Advantage:

- Motor is cheap
- Less maintenance
- Consume less power
- Used in any locations
- No upper limit for speed
- High dynamic response

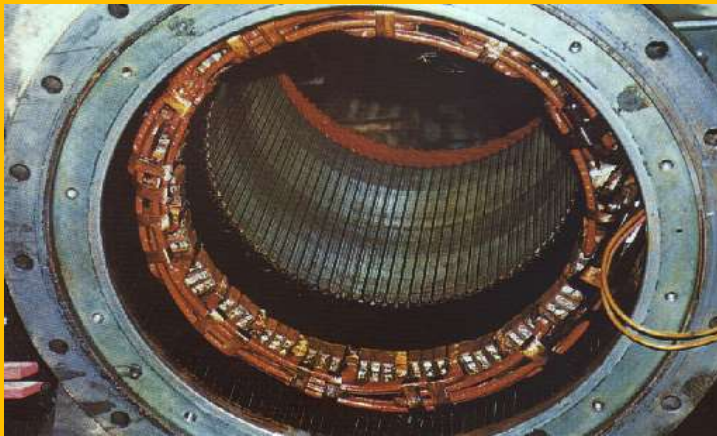
Limitations:

- Control circuit complex in design
- Converters produce harmonics problems
- High starting torque is difficult to achieve

AC INDUCTION MOTOR-

Parts / Types

Stator:



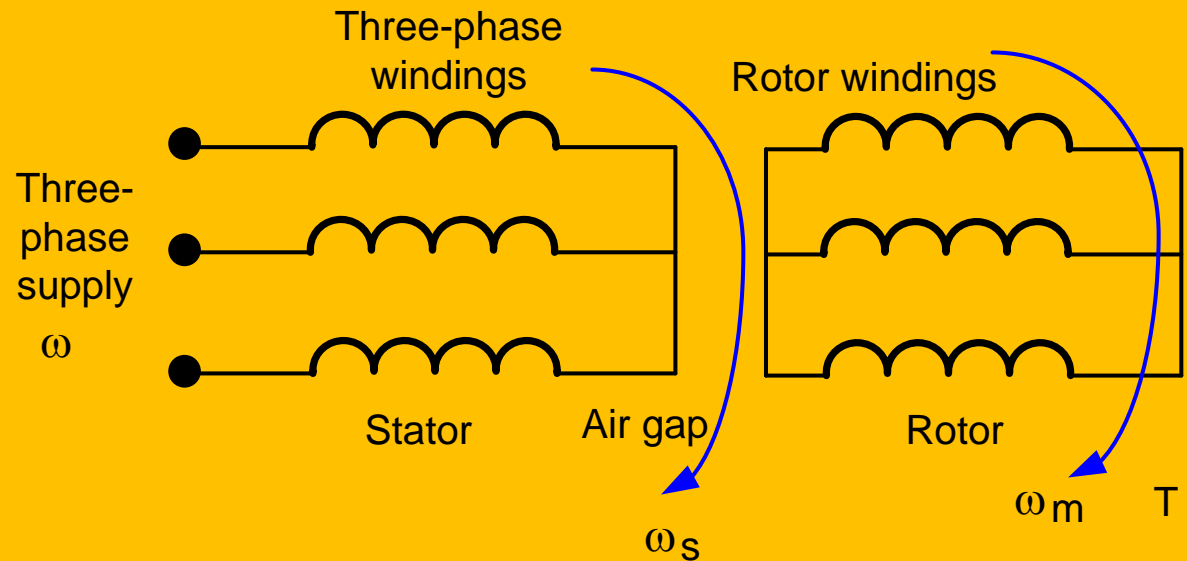
Rotor:



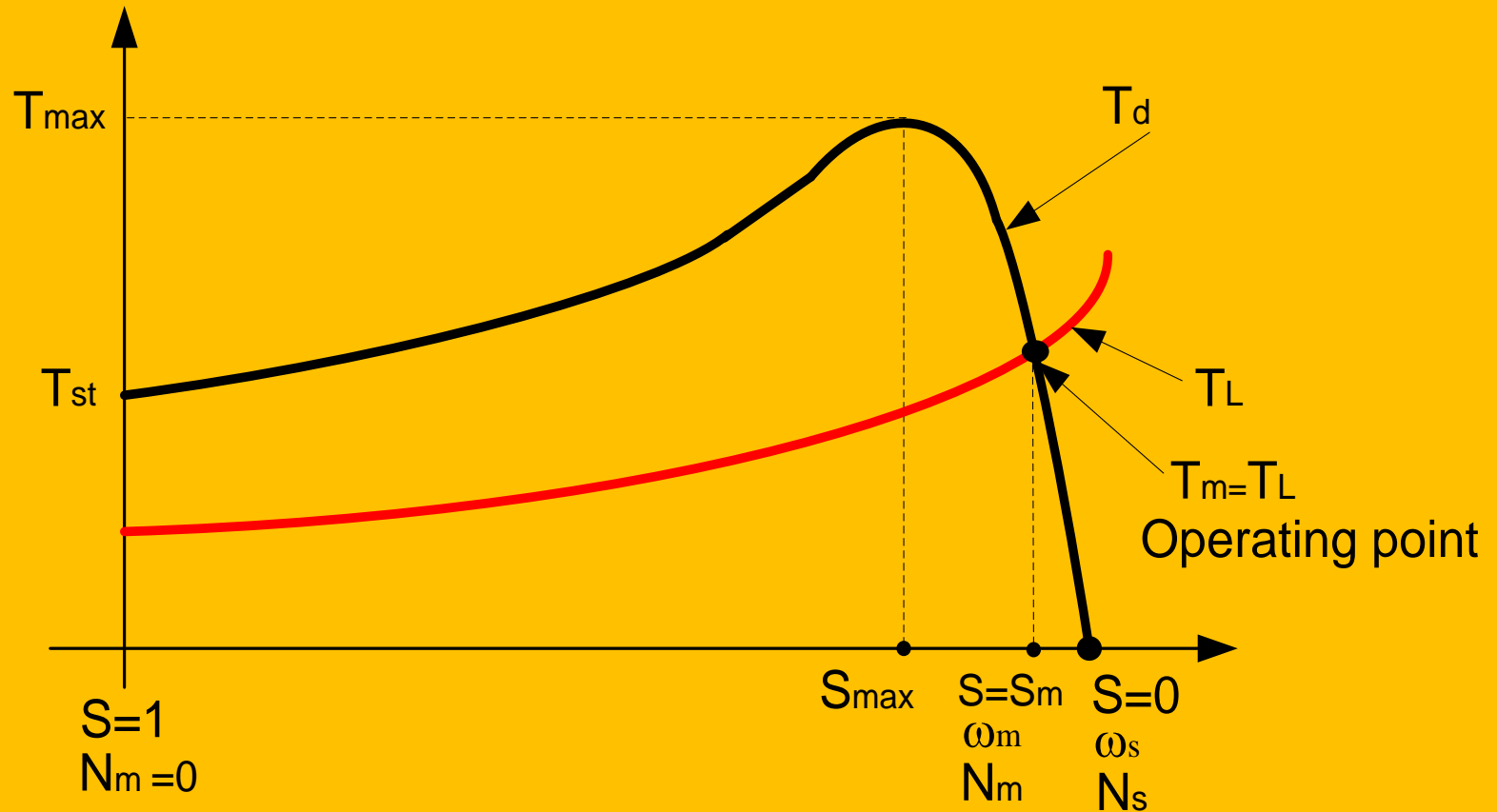
- Single phase IM, Three phase IM
- Squirrel cage, Slip ring motors

PRINCIPLE OF OPERATION

- 3-phase supply to stator
- RMF produces, N_s
- Rotor cuts the flux, an EMF induces
- Relative speed of N_s and N_r
- Rotor rotates



SPEED – TORQUE CHARACTERISTICS



SPEED TORQUE RELATION

Speed:

$$N = 120 f / P$$

- Frequency control
- Pole changing method

Torque:

$$T = V^2 R / Z^2$$

- Supply voltage control
- Rotor resistance control

Relations:

$$T = 3 P / \omega$$

$$\omega = 2 \pi f$$

$$V = 2 \pi f T \phi K_w$$

Where,

f - frequency in Hz

ω - speed in rad /sec

N - speed in RPM

T - torque in Nm

V - supply voltage in V

R - rotor resistance in Ω

P - mechanical power in W

K - constant

SPEED CONTROL METHODS

Stator side control:

- Stator voltage control
- Frequency control
- Stator voltage / frequency control (VFD)

Rotor side control:

- Rotor resistance (voltage) control
- Slip power recovery schemes



Evaluation Time

Summarize the
content...

MCQs



Thanking You.