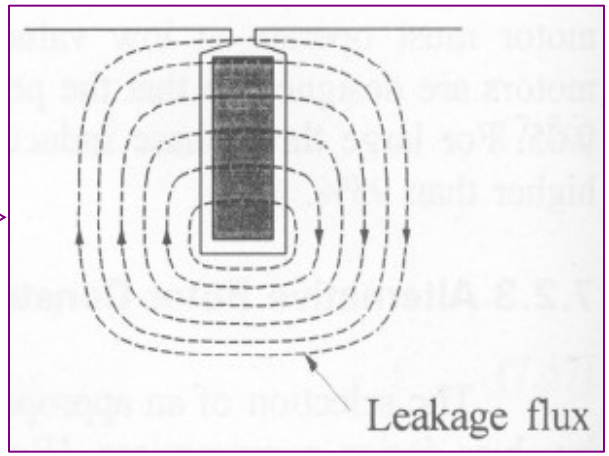
Special Electrical Machines

Deep-Bar Rotor Construction

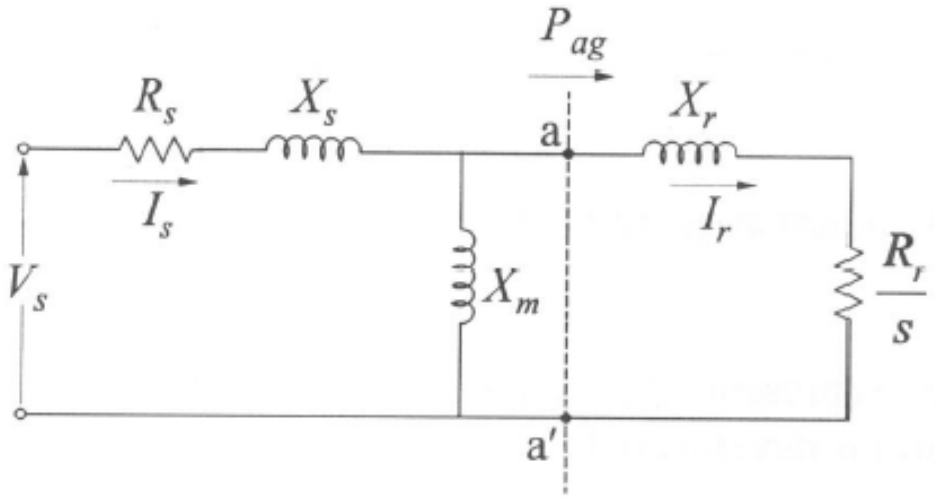
- The use of deep, narrow rotor bars produces torque-slip characteristics similar to those of a double-cage rotor.
- Leakage inductance of the top cross-section of the rotor bar is relatively low; the lower sections have progressively higher leakage inductance.
- At starting, due to the high rotor frequency, the current is concentrated towards the top layers of the rotor bar.
- At full-load operation, the current distribution becomes uniform and the effective resistance is low.

Deep-bar rotor construction

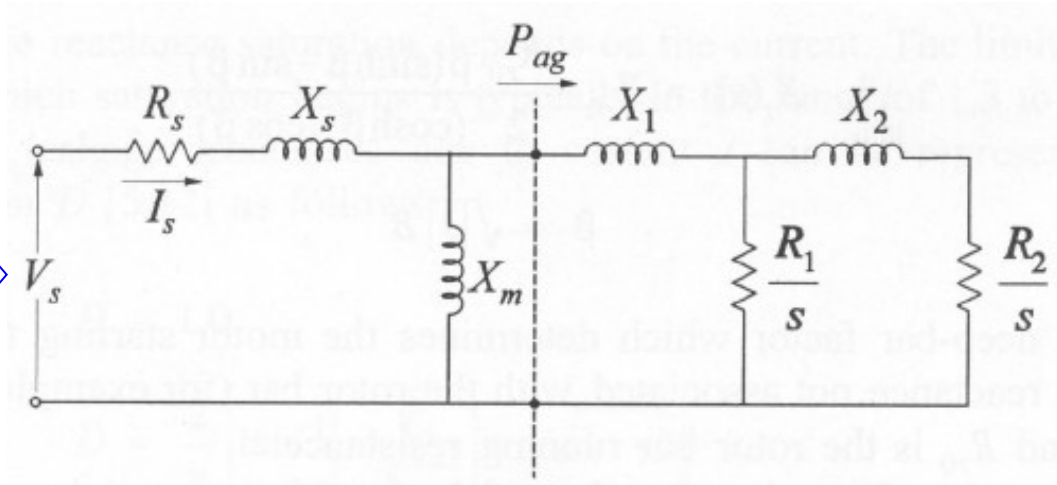


Equivalent Circuit with a Double Cage or Deep Bar Rotor

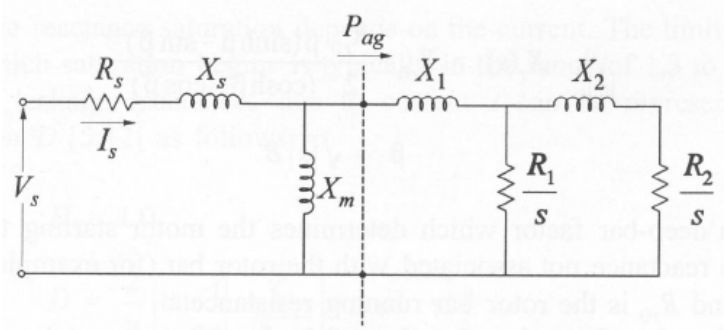
Equivalent circuit of a single-cage induction motor (with one rotor winding).

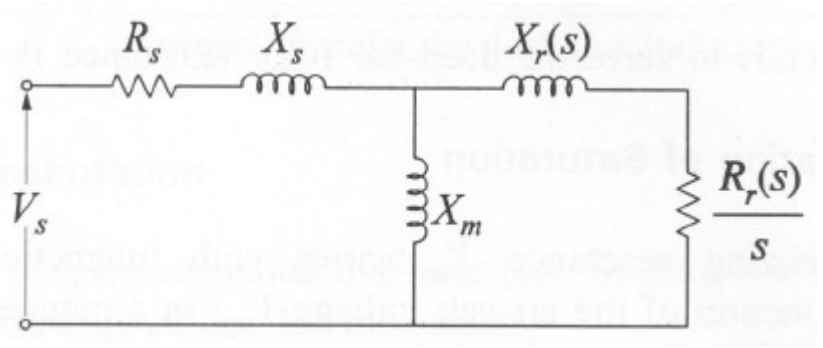


Equivalent circuit of a double-cage induction motor (two rotor windings).



Equivalent Circuit Single Rotor Circuit Representation





For system studies, the rotor should be represented by a single rotor circuit whose parameters vary as a function of slip, *s*.

$$R_r(s) = R_{r0}\frac{m^2 + ms^2\left(R_1 / R_{r0}\right)}{m^2 + s^2}$$

$$X_r(s) = X_1 + \frac{R_{r0}\left(mR_1 / R_2\right)}{m^2 + s^2}$$

where,

$$R_{r0} = \frac{R_1 R_2}{R_1 + R_2}$$

$$m = \frac{R_1 + R_2}{X_2}$$

THANKS….

Queries Please…