LECTURE 2

Synchronous motor

- Synchronous machine is provided with damper windings
- Damper winding is a short-circuited winding similar to the squirrel-cage winding of induction motor

Synchronous Machine Equivalent Circuit

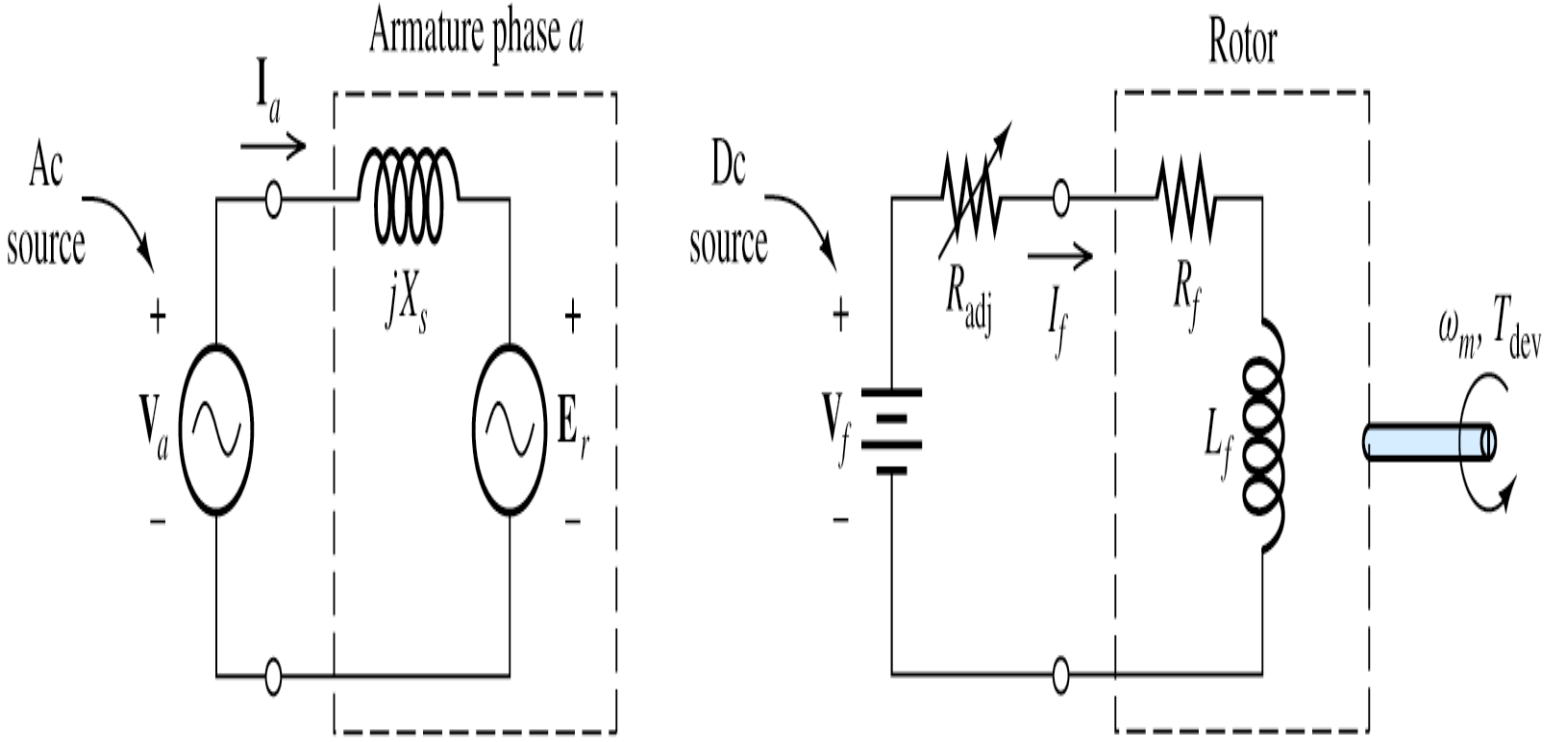
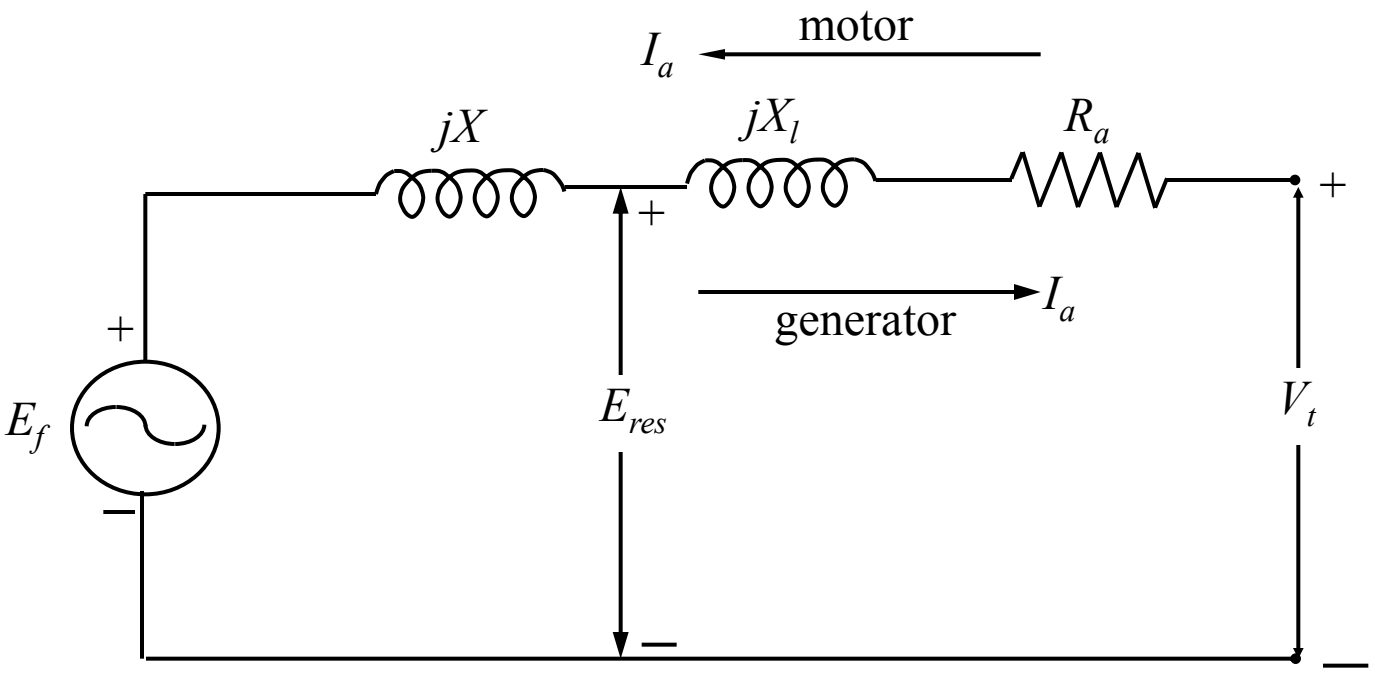


Figure 17.18 Equivalent circuit for the synchronous motor. The armature circuit is based on Equation 17.42.

Equivalent Circuit



Equivalent circuit of a cylindrical-rotor synchronous machine

Vector Diagram

- The equivalent circuit of a synchronous motor is exactly same as the equivalent circuit of a synchronous generator, except that the reference direction of I_a is reversed.
- The basic difference between motor and generator operation in synchronous machines can be seen either in the magnetic field diagram or in the phasor diagram.
- In a generator, E_f lies ahead of V_t, and B_R lies ahead of B_{net}. In a motor, E_f lies behind V_t, and B_R lies behind B_{net}.
- In a motor the induced torque is in the direction of motion, and in a generator the induced torque is a countertorque opposing the direction of motion