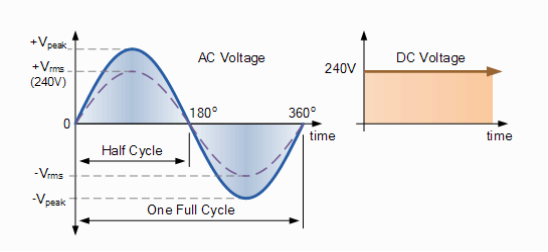
Source Voltage $U_{rms} := 400\ V$

Source Voltage $f_{in} := 50\ Hz$



Peak voltage for in the DC bus section $U_{peak} := U_{rms} \cdot \sqrt{2}$ $U_{peak} = 565,6854\ V$

$$U_{av} := \frac{U_{peak}}{1,11} \qquad U_{av} = 509,6265\ V$$

The winding of a motor can be simplefied to a RL circuit

The impedance of the circuit will be:

frequency of varied voltage $U_v := 400\ V$

frequency of varied Hz $f_v := 50\ Hz$

Resistance $R_{winding} := 5\ ohm$

Inductance $L_1 := \frac{R_{winding} \cdot \sqrt{3}}{2 \cdot \pi \cdot f_v}$ $L_1 = 27,5664\ mH$

Inductive reactance. $X_l := 2 \cdot \pi \cdot f_v \cdot L_1$ $X_l = 8,6603\ \Omega$

capacitance $C_1 := 0,001\ farad$

Inductive reactance. $X_c := \frac{1}{2 \cdot \pi \cdot f_v \cdot C_1}$ $X_c = 3,1831\ \Omega$

impedence $Z_1 := \sqrt{R_{winding}^{\ 2} + \left(X_l + X_c\right)^2}$ $Z_1 = 12,8555\ \Omega$

If the current and frequency maintain the same ratio below the motor value, the current also remains constant. If the current is constant, the torque is also constant.

Current $$I_x := \frac{U_v}{\sqrt{R_{winding}^{\ 2} + \left(2 \cdot \pi \cdot f_v \cdot L_1 + X_c\right)^2}} \qquad I_x = 31,115\ A$$

Number of poolpairs $Pools_{motor} := 2$

frequency of varied rotation $n_{sync} := \frac{f_v \cdot 2 \cdot \pi}{Pools_{motor}}$ $n_{sync} = 1500\ rpm$

$n_{sha} := 1425\ rpm$

synchroon speed $n_{syn} := 1500\ rpm$

slip $s_1 := \frac{n_{syn} - n_{sha}}{n_{sha}} \cdot 100\ \%$ $s_1 = 5,2632\ \%$

$$T_{motor} := \frac{\frac{U_{rms}}{\sqrt{R_{winding}^{2} + \left(2 \cdot \pi \cdot f_v \cdot L_1 + X_c\right)^2}} \cdot U_{rms}}{n_{sync}} \qquad T_{motor} = 79,2336\ \text{N m}$$

$$p_{motor} := \frac{U_{rms}}{\sqrt{R_{winding}^{2} + \left(2 \cdot \pi \cdot f_v \cdot L_1 + X_c\right)^2}} \cdot U_{rms} \qquad p_{motor} = 12,446\ \text{kW}$$

Maximum Current over the motor on the plate

$$P_{max50Hz} := 15\ \text{kW}$$

$$I_{nom} := \frac{P_{max50Hz}}{U_{rms} \cdot \sqrt{3} \cdot 0,86 \cdot 0,95} \qquad I_{nom} = 26,5002\ \text{A}$$