```
f = 60;
P = 8;
slip = 0.04;
n_sync = f*120/P;
w_sync = (n_sync/60)*2*pi;
n_m = (1 - slip)*n_sync;
w_m = (n_m/60)*2*pi;
```

$$\begin{bmatrix} v_A \\ v_B \\ v_C \\ v_a \\ v_b \\ v_c \end{bmatrix} = \begin{bmatrix} r_s & 0 & 0 & 0 & 0 & 0 \\ 0 & r_s & 0 & 0 & 0 & 0 \\ 0 & 0 & r_s & 0 & 0 & 0 \\ 0 & 0 & 0 & r_r & 0 & 0 \\ 0 & 0 & 0 & 0 & r_r & 0 \\ 0 & 0 & 0 & 0 & 0 & r_r \end{bmatrix} \cdot \begin{bmatrix} i_A \\ i_B \\ i_C \\ i_a \\ i_b \\ i_c \end{bmatrix} + \left\{ \frac{d}{dt} \cdot \begin{bmatrix} 0 & 0 & 0 & L_{srm} & L_{srm} & L_{srm} \\ 0 & 0 & 0 & L_{srm} & L_{srm} & L_{srm} \\ 0 & 0 & 0 & L_{srm} & L_{srm} & L_{srm} \\ L_{rsm} & L_{rsm} & L_{rsm} & 0 & 0 & 0 \\ L_{rsm} & L_{rsm} & L_{rsm} & 0 & 0 & 0 \\ L_{rsm} & L_{rsm} & L_{rsm} & 0 & 0 & 0 \end{bmatrix} \right\} \cdot \begin{bmatrix} i_A \\ i_B \\ i_C \\ i_a \\ i_b \\ i_c \end{bmatrix} +$$

$$\begin{bmatrix} L_{ss} & L_{sm} & L_{sm} & L_{srm} & L_{srm} & L_{srm} \\ L_{sm} & L_{ss} & L_{sm} & L_{srm} & L_{srm} & L_{srm} \\ L_{sm} & L_{sm} & L_{ss} & L_{srm} & L_{srm} & L_{srm} \\ L_{rsm} & L_{rsm} & L_{rsm} & L_{rr} & L_{rm} & L_{rm} \\ L_{rsm} & L_{rsm} & L_{rsm} & L_{rm} & L_{rr} & L_{rm} \\ L_{rsm} & L_{rsm} & L_{rsm} & L_{rm} & L_{rm} & L_{rr} \end{bmatrix} \cdot \left\{ \frac{d}{dt} \cdot \begin{bmatrix} i_A \\ i_B \\ i_C \\ i_a \\ i_b \\ i_c \end{bmatrix} \right\}$$

State Space Model of the Three-Phase Induction Motor with stator / rotor self and mutual inductances that includes ohmic, rotational and transformer voltage expressions.

$$\begin{bmatrix} v_A \\ v_B \\ v_C \\ v_a \\ v_b \\ v_c \end{bmatrix} = \begin{bmatrix} 0.52 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.52 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.52 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.11 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.11 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.11 \end{bmatrix} \cdot \begin{bmatrix} i_A \\ i_B \\ i_C \\ i_a \\ i_b \\ i_c \end{bmatrix} +$$

$$\frac{d}{dt} \left\{ \begin{bmatrix} 0.0738 & -0.0354 & -0.0354 & 0.0707^{*} & 0.0707^{**} & 0.0707^{***} \\ -0.0354 & 0.0738 & -0.0354 & 0.0707^{***} & 0.0707^{*} & 0.0707^{**} \\ -0.0354 & -0.0354 & 0.0738 & 0.0707^{**} & 0.0707^{***} & 0.0707^{*} \\ 0.0707^{*} & 0.0707^{***} & 0.0707^{**} & 0.0713 & -0.0354 & -0.0354 \\ 0.0707^{**} & 0.0707^{*} & 0.0707^{***} & -0.0354 & 0.0713 & -0.0354 \\ 0.0707^{***} & 0.0707^{**} & 0.0707^{*} & -0.0354 & -0.0354 & 0.0713 \end{bmatrix} \cdot \begin{bmatrix} i_A \\ i_B \\ i_C \\ i_a \\ i_b \\ i_c \end{bmatrix} \right\}$$

State Space Model of the Three-Phase Induction Motor with numeric values.

The cosinusoidal functions on the mutual inductances between the rotor and stator can be determined utilizing the relation found below:

$$cos(\omega t) = *$$
$$cos(\omega t + \frac{2\pi}{3}) = **$$
$$cos(\omega t + \frac{4\pi}{3}) = ***$$