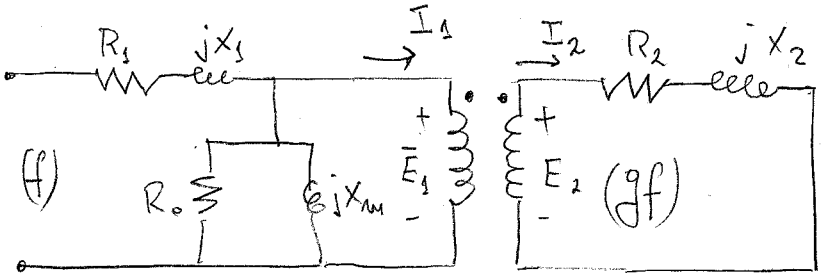
Motor de Induccion

Modelo:



$$\begin{cases} \dfrac{\bar{E}_1}{N_1} = \dfrac{\bar{E}_2}{g N_2} \\ N_1 \bar{I}_1 = N_2 \bar{I}_2 \end{cases}$$

$$X_2 = 2\pi g f L_{f2} = g X_2' \qquad \text{con } X_2' = 2\pi f L_{f2}$$

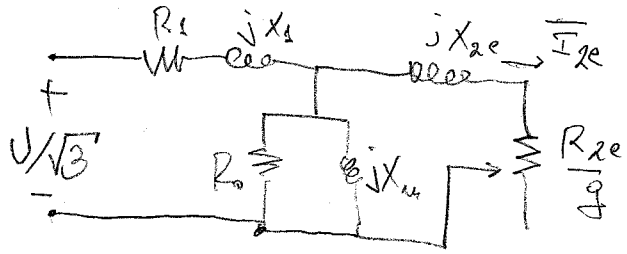
Se pase la impedancia de C.C. de rotor al estator:

$$\bar{E}_2 = \bar{Z}_2 \bar{I}_2 \qquad \text{con } \bar{Z}_2 = R_2 + j g X_2'$$

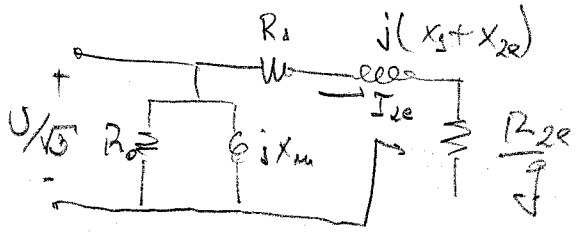
$$\Rightarrow g \frac{N_2}{N_1} \bar{E}_1 = \bar{Z}_2 \frac{N_1}{N_2} \bar{I}_1 \Rightarrow \frac{\bar{E}_1}{\bar{I}_1} = \left(\frac{N_1}{N_2}\right)^2 \frac{\bar{Z}_2}{g} = \left(\frac{N_1}{N_2}\right)^2 \frac{R_2}{g} + j \left(\frac{N_1}{N_2}\right)^2 \frac{g X_2'}{g}$$

$$\Rightarrow \boxed{\frac{\bar{E}_1}{\bar{I}_1} = \bar{Z}_V = \frac{R_{2e}}{g} + j X_{2e}} \qquad \text{con: } \begin{cases} R_{2e} = \left(\frac{N_1}{N_2}\right)^2 R_1 \\ X_{2e} = \left(\frac{N_1}{N_2}\right)^2 X_2' \end{cases}$$

Entonces el circuito queda:



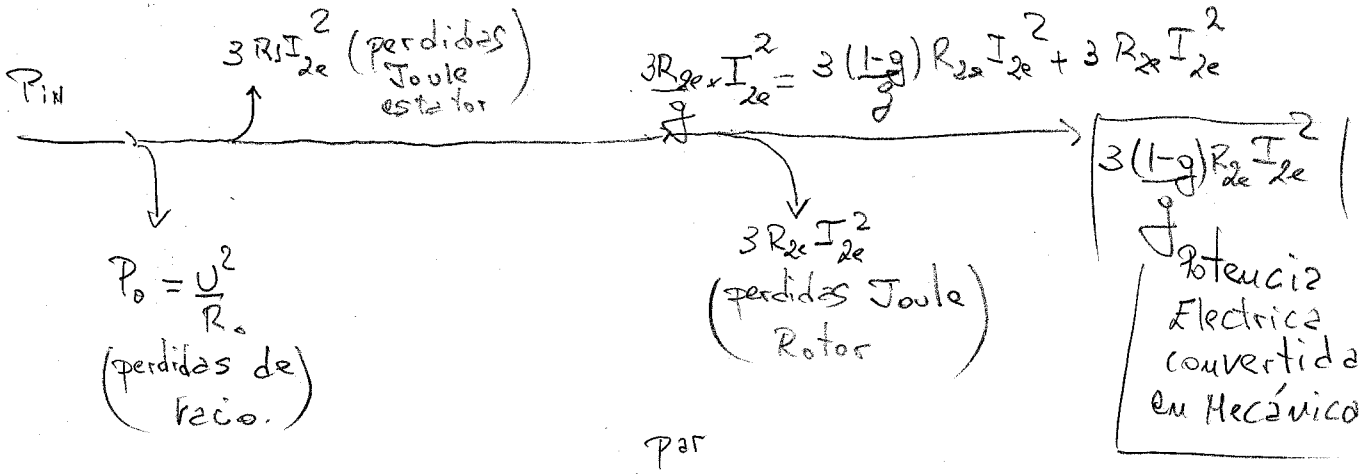
Circuito Equivalente Aproximado:



Este circuito se usara para la resolucion de los problemas del practico:

Curva Par - velocidad

Balance de Potencia:



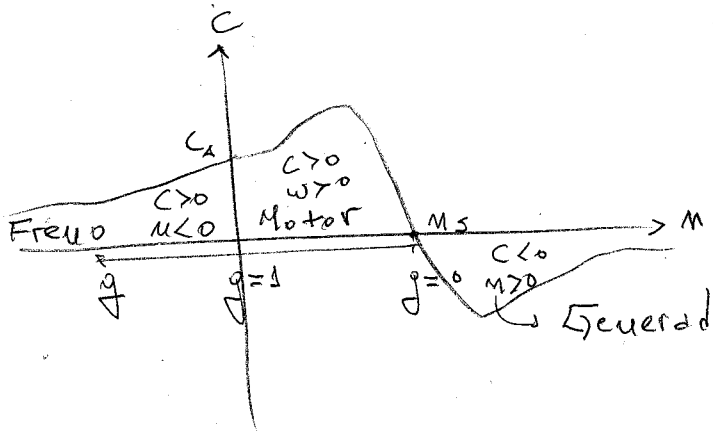
Par

Entonces: $P_m = 3R_{2e}\left(\frac{1-g}{g}\right)I_{2e}^2 = C \cdot \omega$

Deslizamiento: $g = \frac{\omega_s - \omega}{\omega_s} = \frac{n_s - n}{n_s} \Rightarrow \omega = (1-g)\omega_s$

$$\Rightarrow \boxed{C = \frac{3}{\omega_s}\frac{R_{2e}}{g}I_{2e}^2} \neq \qquad \bar{I}_{2e} = \frac{U/\sqrt{3}}{\left(R_1 + \frac{R_{2e}}{g}\right) + j(X_1 + X_{2e})}$$

$$|I_{2e}| = \frac{U/\sqrt{3}}{\sqrt{\left(R_1 + \frac{R_{2e}}{g}\right)^2 + (X_1 + X_{2e})^2}} \Rightarrow \boxed{C = \frac{R_{2e}}{g\omega_s}\frac{U^2}{\left(R_1 + \frac{R_{2e}}{g}\right)^2 + (X_1 + X_{2e})^2}}$$



1) Par: $C \propto U^2$!!

2) Tres zonas de funcionamiento

- Motor $P_m > 0$ $\begin{cases} C>0 \\ \omega>0 \end{cases}$
- Generador $P_m < 0$ $\begin{cases} C<0 \\ \omega>0 \end{cases}$
- Freno $P_m < 0$ $\begin{matrix} C>0 \\ n<0 \end{matrix}$