Prof. A. M. Kulkarni
Lec-23. Date. 11-6-

2.2 model (Rotor Wdgs.)

2 dampers on Q axis.

1 damper
1 field } on D axis.

$$T_q'' \frac{d\psi_K}{dt} = [-\psi_K + \psi_q]$$

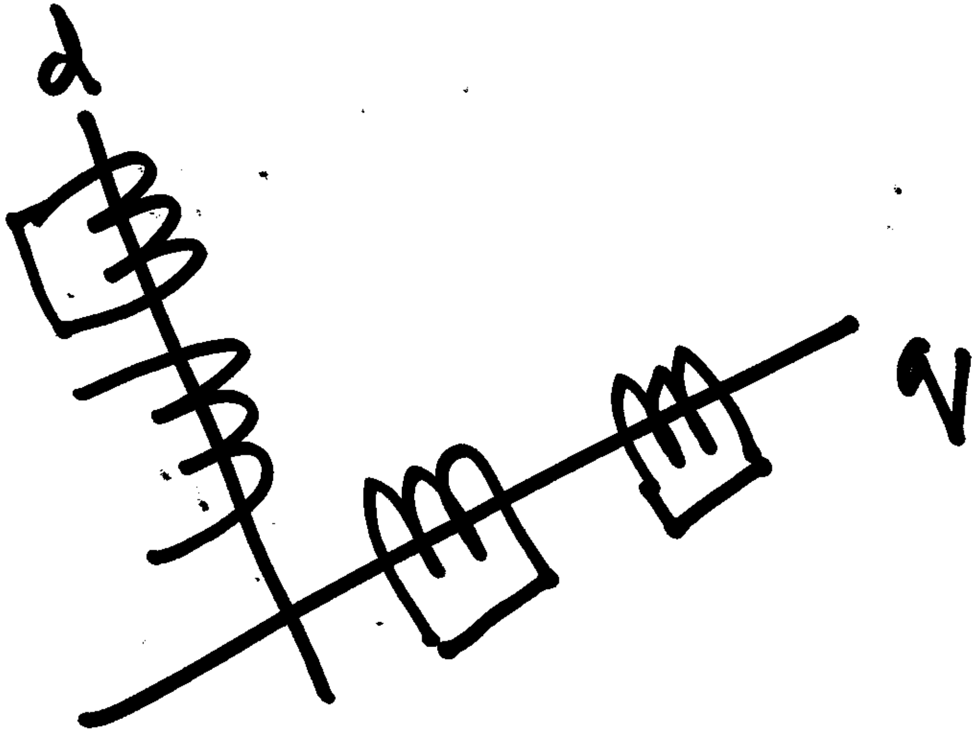
$$T_q'' \to 0$$

$$\boxed{\psi_K = \psi_q}$$

2:1

$\downarrow$

T_a " , x_a "



$$R_K \to \infty$$

$$T_q'' \to 0$$

$$\psi_q = x_q' i_q + \frac{(x_q - x_q')}{x_q}\psi_G$$

$$\psi_q = x_q'' i_q + \frac{(x_q' - x_q'')}{x_q'}\psi_K + \frac{(x_q - x_q')}{x_q} \cdot \frac{x_q''}{x_q'}\psi_G$$

$x_q'' = x_q'$

$$4q = m^2 q + m\, Y_G$$

Set

$$x_q'' = x_q'$$

in

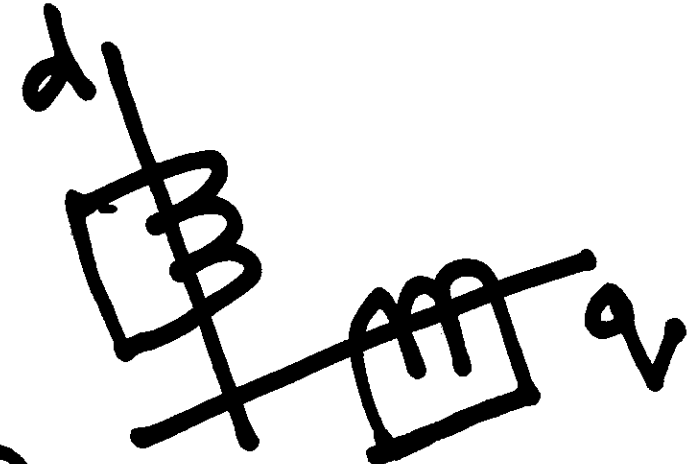
2.2 model equations.

1.1

$$x' = x_d' = x_q'$$

$$T' = T_d' = T_q'$$

$$E_{fd} = 0$$



$$T_q' \frac{d\psi_G}{dt} = -\psi_g + \psi_q$$

$$T_q' \to 0$$

$$\psi_G = \psi_q.$$

$$\psi_d = x_d' i_d + E'$$

$$\psi_q = x_d' i_q$$

$$0 = -\omega_B \psi_q - \omega_B v_d .$$

$$0 = \omega_B \psi_d - \omega_B v_q .$$

$$(\psi_d i_q - \psi_q i_d) = \frac{V_{rms} E'}{x_d'} \sin\delta$$

$$0 = -x_d' i_q - v_d.$$

$$0 = x_d' i_d + E' - v_q$$

$$\frac{2H}{\omega_B}\frac{d\omega}{dt} = T_m - (\psi_d i_q - \psi_q i_d)$$

$$\boxed{\begin{aligned} V_d &= -V_{LLrms} \cdot \sin\delta \\ V_q &= V_{LLrms} \cos\delta \end{aligned}}$$

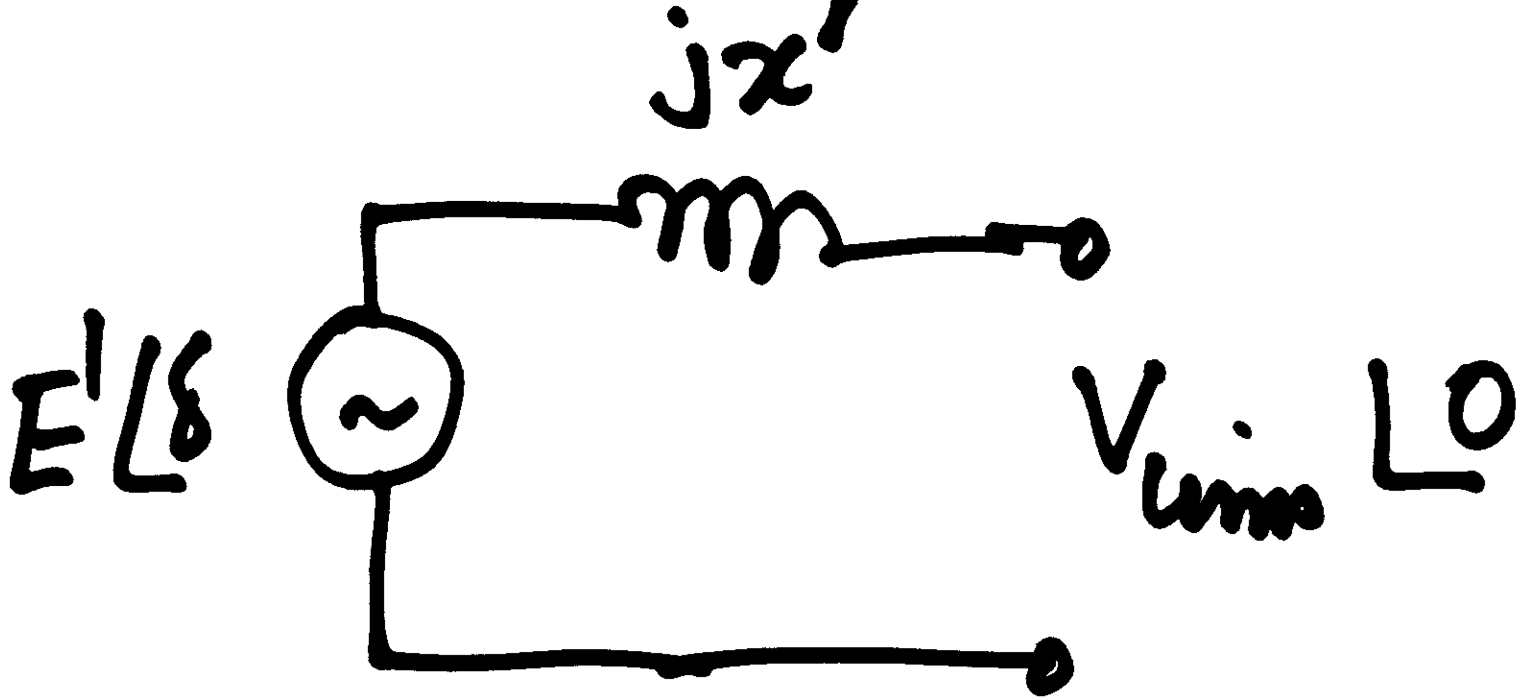
$$E' - (v_q + j v_d)$$

$$= j x' (i_q + j i_d)$$

$$(v_q + j v_d) = V_{rms} e^{-j\delta}$$

$$\frac{d\delta}{dt} = \omega - \omega_0$$

$$\frac{2H}{\omega_B}\frac{d\omega}{dt} = T_m - \frac{V_{rms}E'\sin\delta}{x'_d}$$



$$d\delta/dt = \omega - \omega_0$$

$$\frac{2H}{\omega_b}\frac{d\omega}{dt} = T_m - \frac{E' V_{inf} \sin\delta}{x'}$$

$$E' - (v_{um}) e^{-j\delta} = jx(i_q + j i_d)$$

$$E' e^{j\delta} - v_{um} = jx(i_Q + j i_D)$$

$$(i_Q + j i_D) = (i_q + j d) e^{j\delta}.$$