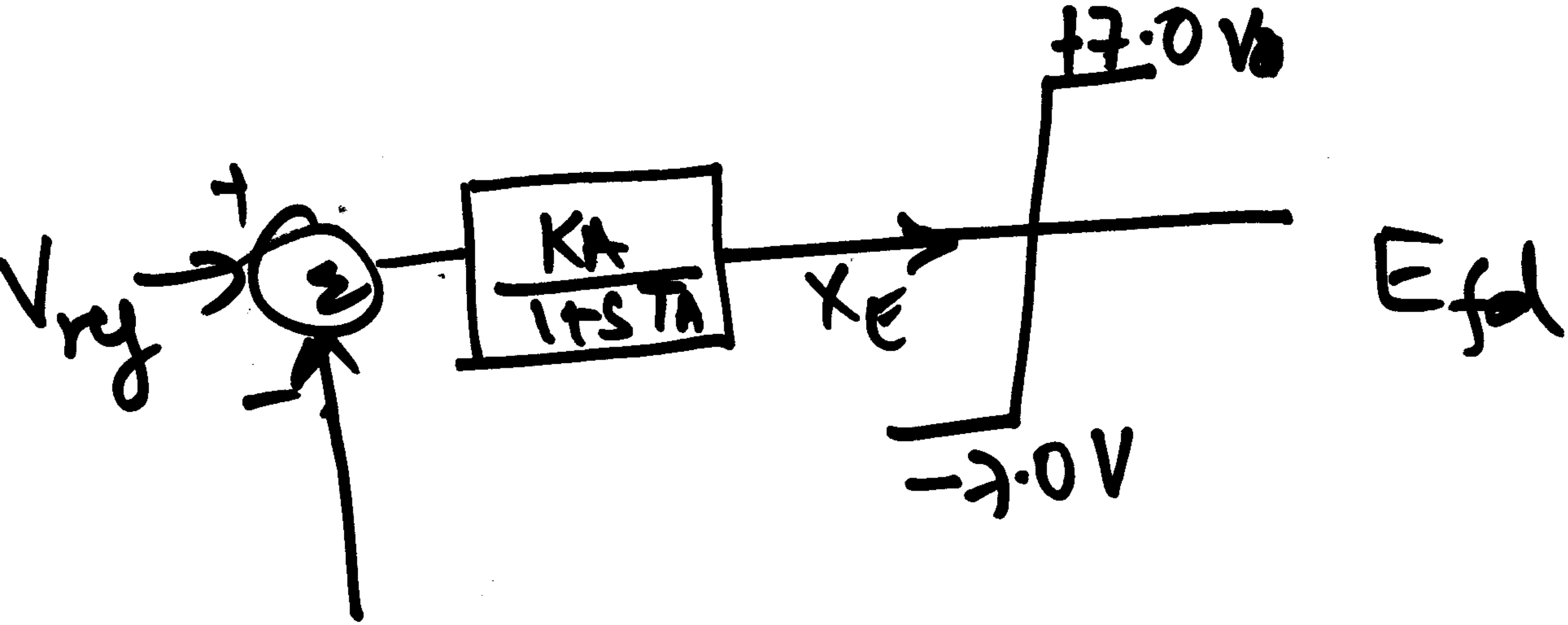
Prof. A.M. Kulkarni
Lec No. 28
2/7/10

$$\frac{d\psi_d}{dt} = -\omega\psi_q - \omega_B R_a i_d - \omega_B \cdot V_d$$

$$\frac{x_d \, di_d}{dt} = -\omega x i_q + \omega_B (V_d - E_d)$$

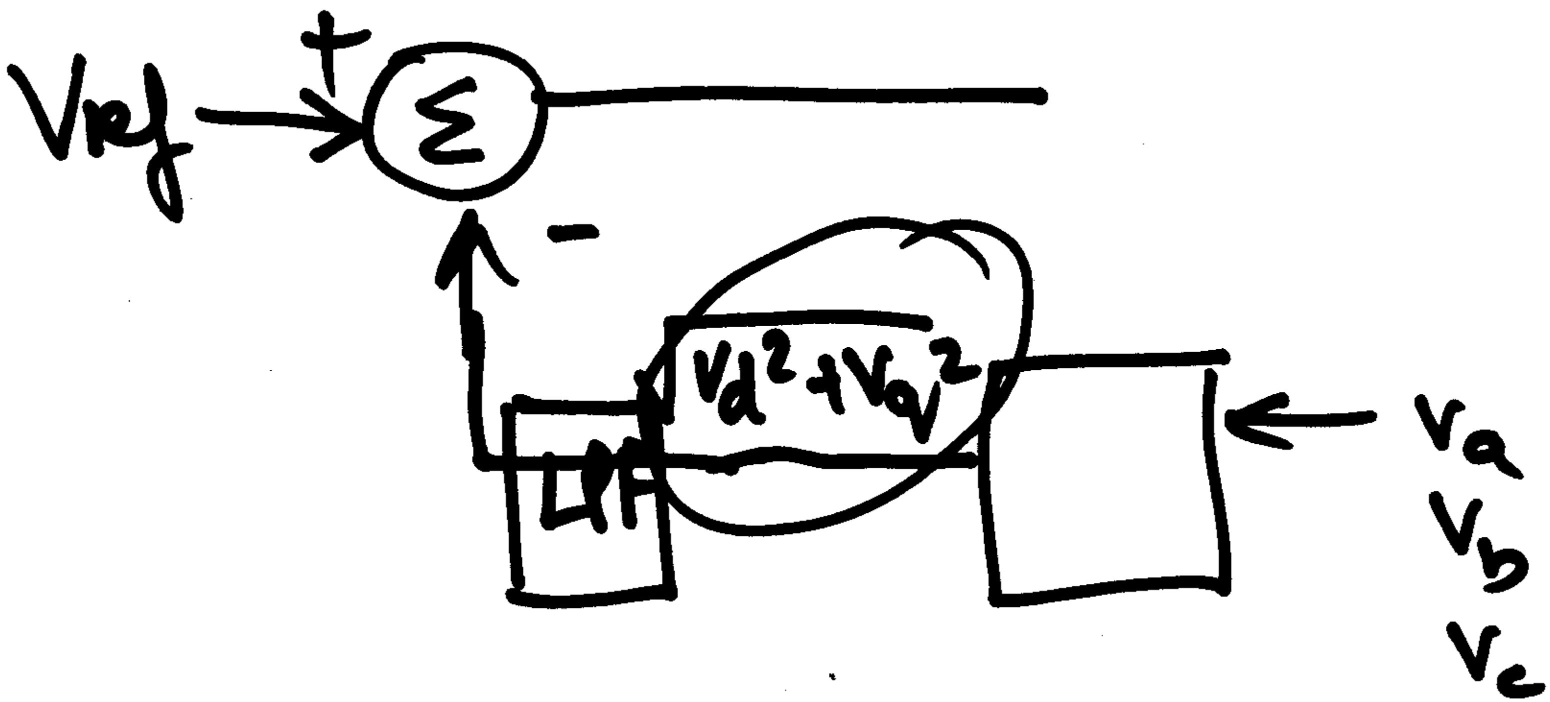
$$\frac{d(\psi_d + x_d i_d)}{dt} = -\omega(\psi_q + x i_q) - \omega_B R_a i_d - \omega_B E_d.$$



$$x_E \neq E_{fd}$$

$$\left.\begin{array}{l}\dot{x}_E = E_{fd} \\ -7V < x_E < +7V\end{array}\right\}$$

$$\underset{\sim}{V} \triangleq \sqrt{V_d^2 + V_q^2}$$



$\longrightarrow V_{an}(t)$

$\longrightarrow V_{bn}(t)$

$\longrightarrow v_{cn}(t)$

$$\sqrt{V_{as}^2 + V_{ac}^2}$$

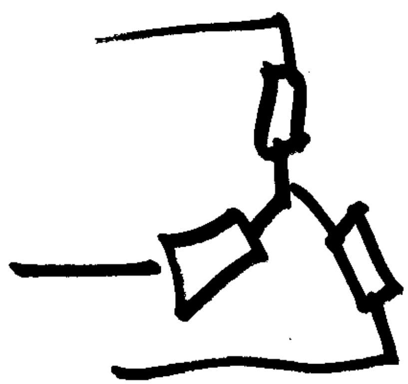
$$V_{as} = \frac{1}{T}\int_{t-T}^{T} v_{an}(t)\sin\omega_0 t \, dt.$$

$$V_{ac} = \frac{1}{T}\int_{t-T}^{T} v_{an}(t)\cos\omega_0 t \, dt$$

$$P(t) = v_a i_a + v_b i_b + v_c i_c .$$

$$= v_d i_d + v_q i_q + v_0 i_0 .$$

$$Q(t) \triangleq \underline{v_d i_q - v_q i_d} \quad !$$



$$C_P^T C_P V = \left\{ \begin{bmatrix} V_a & V_b & V_c \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} \right\}^{1/2}$$

$$\left\{ \begin{bmatrix} V_a & V_b & V_c \end{bmatrix} I \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} \right\}^{1/2}$$

$$V = \sqrt{V_a^2 + V_b^2 + V_c^2}$$

$$= \sqrt{V_d^2 + V_q^2 + V_0^2}.$$

$$V = \sqrt{V_d^2 + V_q^2} \Big\}.$$

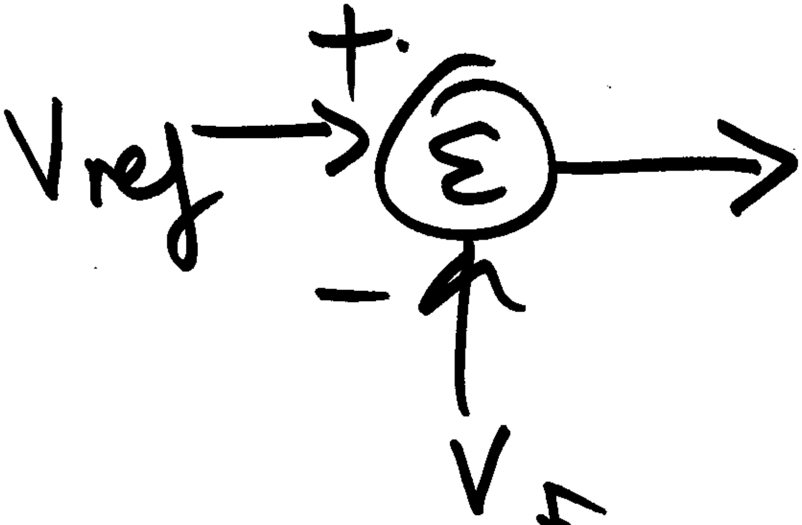
$\to V_a$ $\quad V = \underbrace{\left(\sqrt{V_{a(t)}^2 + V_{b(t)}^2 + V_{c(t)}^2}\right)}$

$\to V_b$

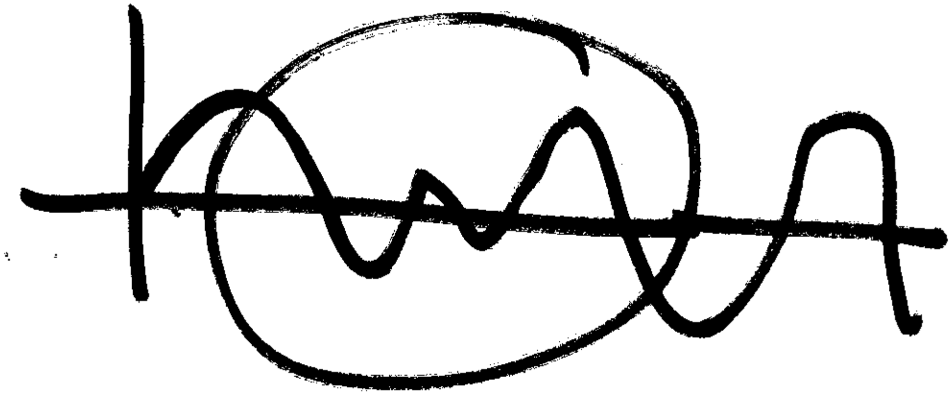
$\to V_c$

$V = \text{const}$

$= \underline{\text{LL rms}}.$

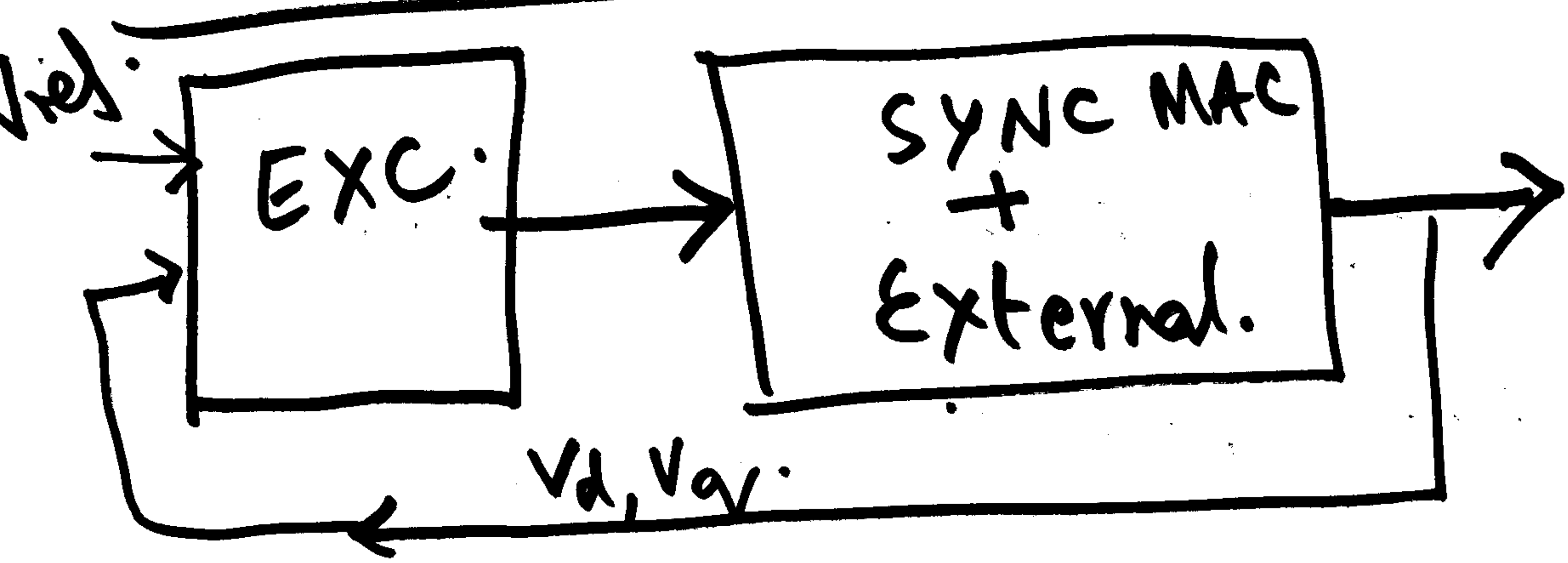


$$V = ?$$



$$v(t) = V \sin\omega t$$

$$\frac{d(\psi_q + x_q i_q)}{dt} = +\omega(\psi_d + x\, i_d) - \omega_B R_a i_q - \omega_B E_q$$



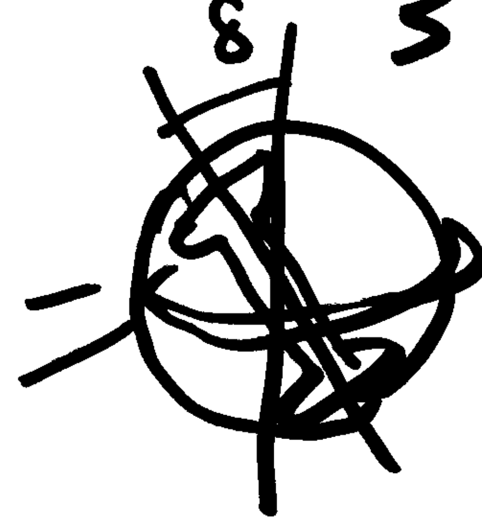
$$\frac{d\theta}{dt} = \omega = \omega_0 + \frac{d\delta}{dt}$$

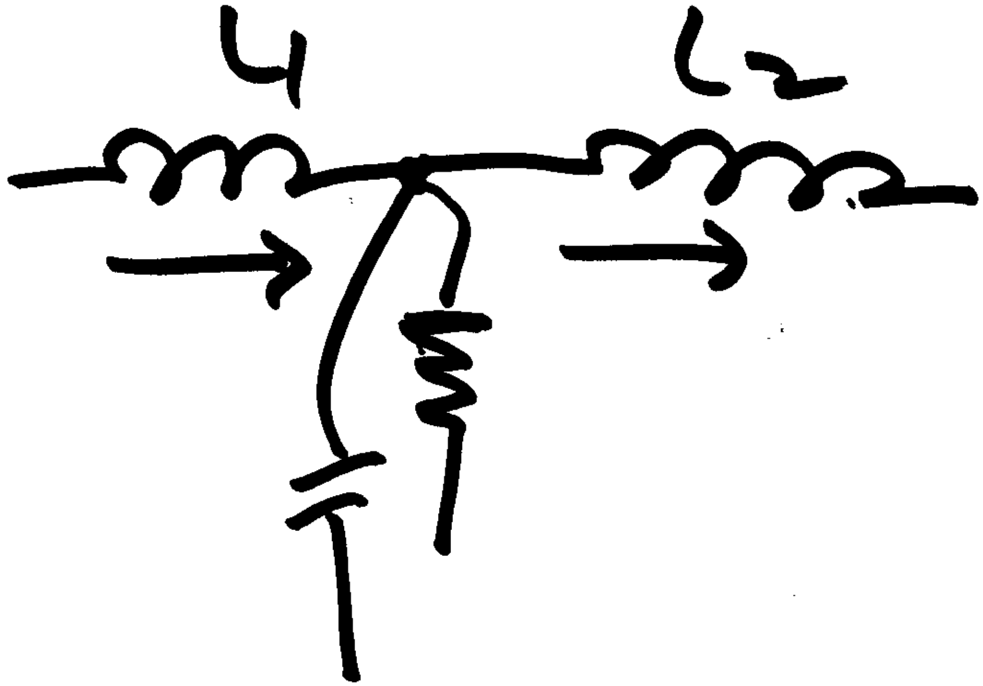
$$E_a = \sqrt{\frac{2}{3}}\, \underline{E} \sin(\omega_0 t)$$

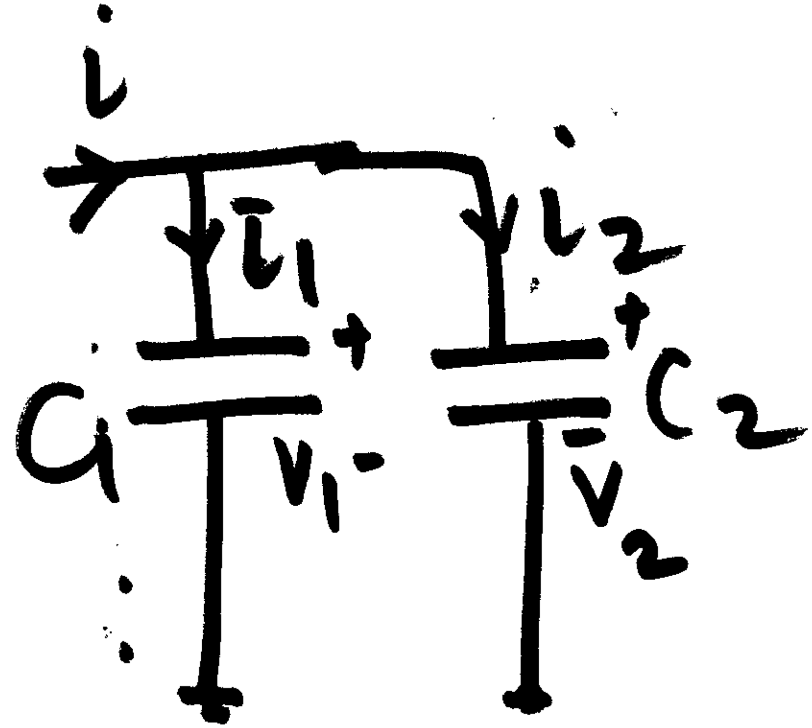
$$E_b = \sqrt{\frac{2}{3}}\, E \sin\left(\omega_0 t - \frac{2\pi}{3}\right)$$

$$E_c = \sqrt{\frac{2}{3}}\, E \sin\left(\omega_0 t + \frac{2\pi}{3}\right)$$

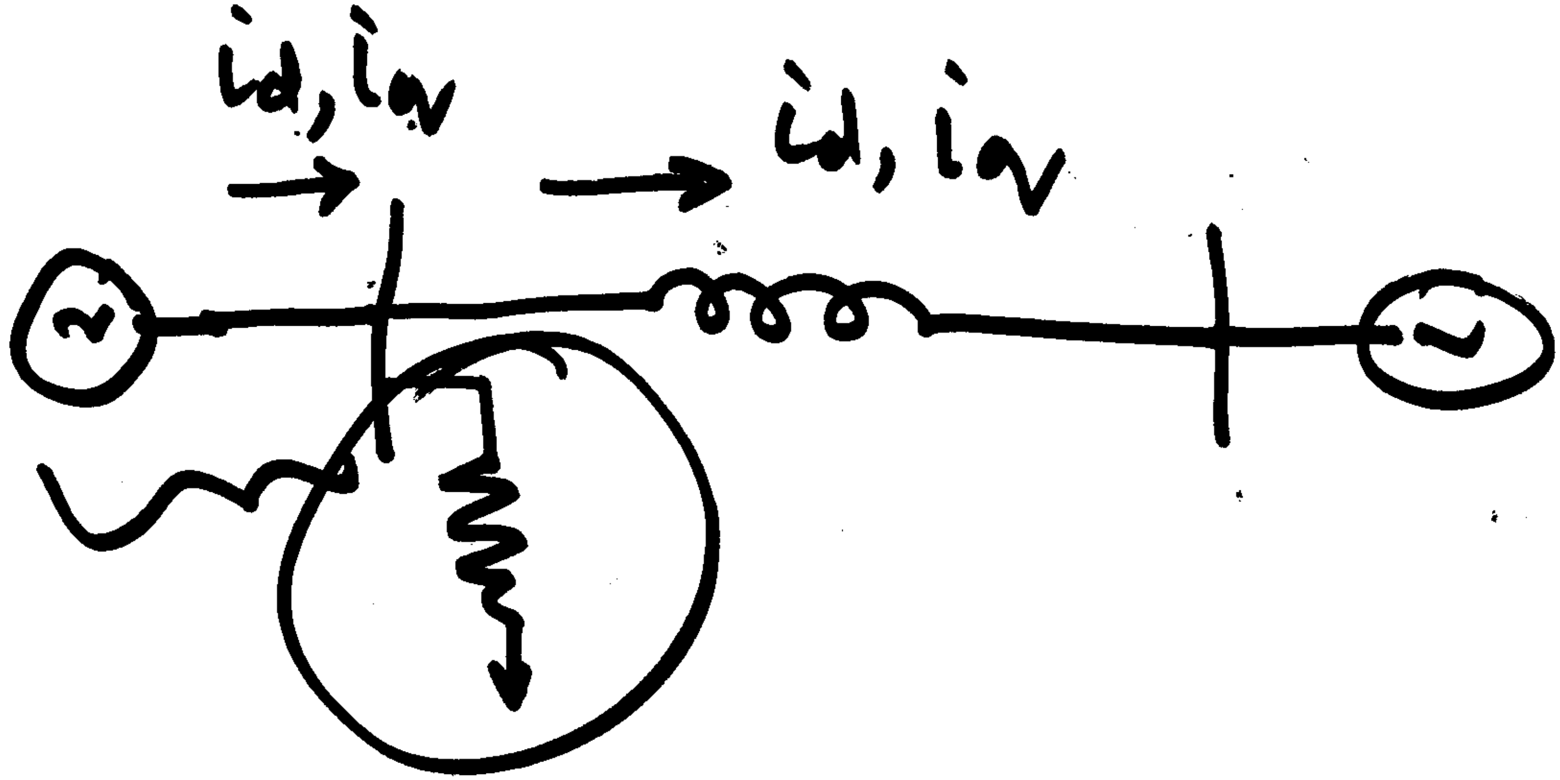
$$\theta = \omega_0 t + \underline{\delta}$$



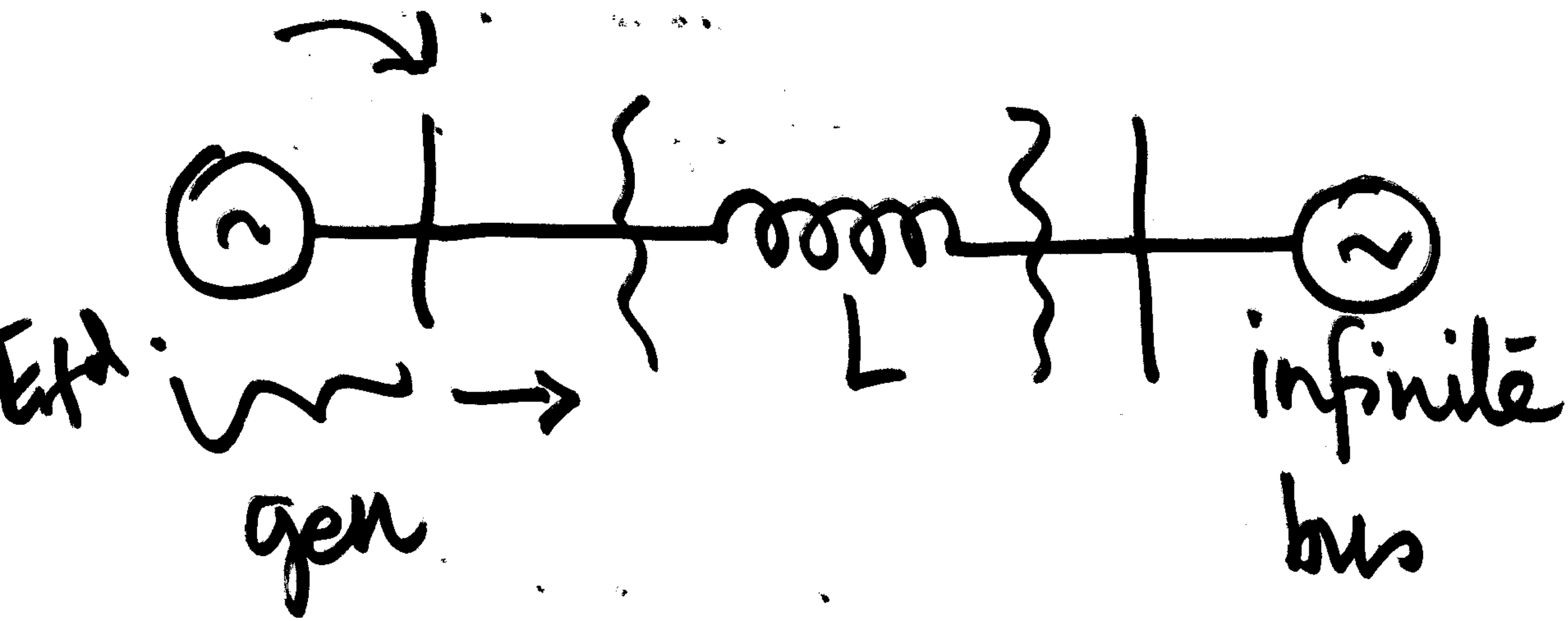

L1
L2



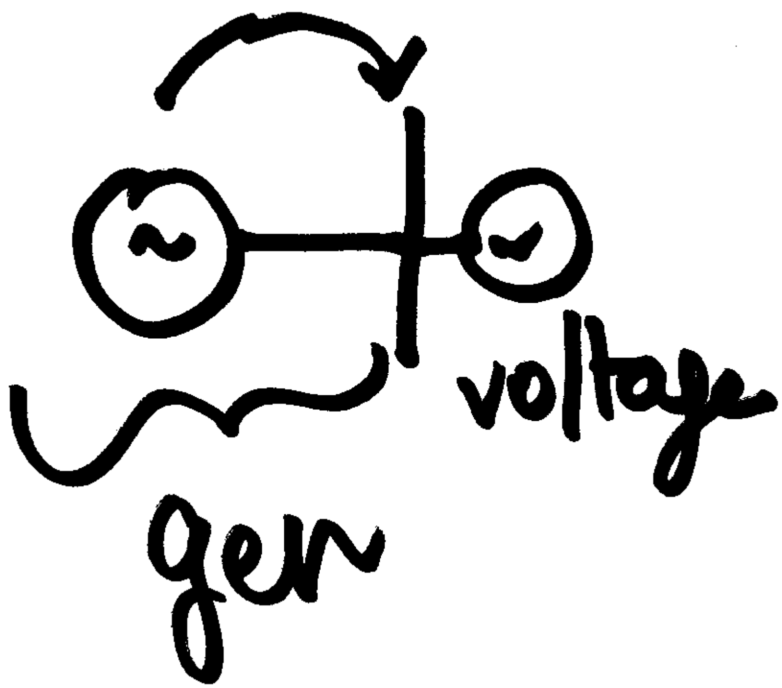
$$\begin{cases} C_1 \dfrac{dV_1}{dt} = i_1 \qquad C_2 \dfrac{dV_2}{dt} = i_2 \\ V_1 = V_2 \qquad\qquad i_1 + i_2 = i \end{cases}$$



id, iq
id, iq



E_{fd}
gen
L
infinite bus


voltage
gen


gen
t.l.
infinite
bus