Prof. A.M. Kulkarni
Date - 18-8-10
Lec. No - 33

$$\left.\begin{aligned} i_m(t) &= -\frac{1}{Z_c} v_m(t) + I_m \end{aligned}\right\}$$

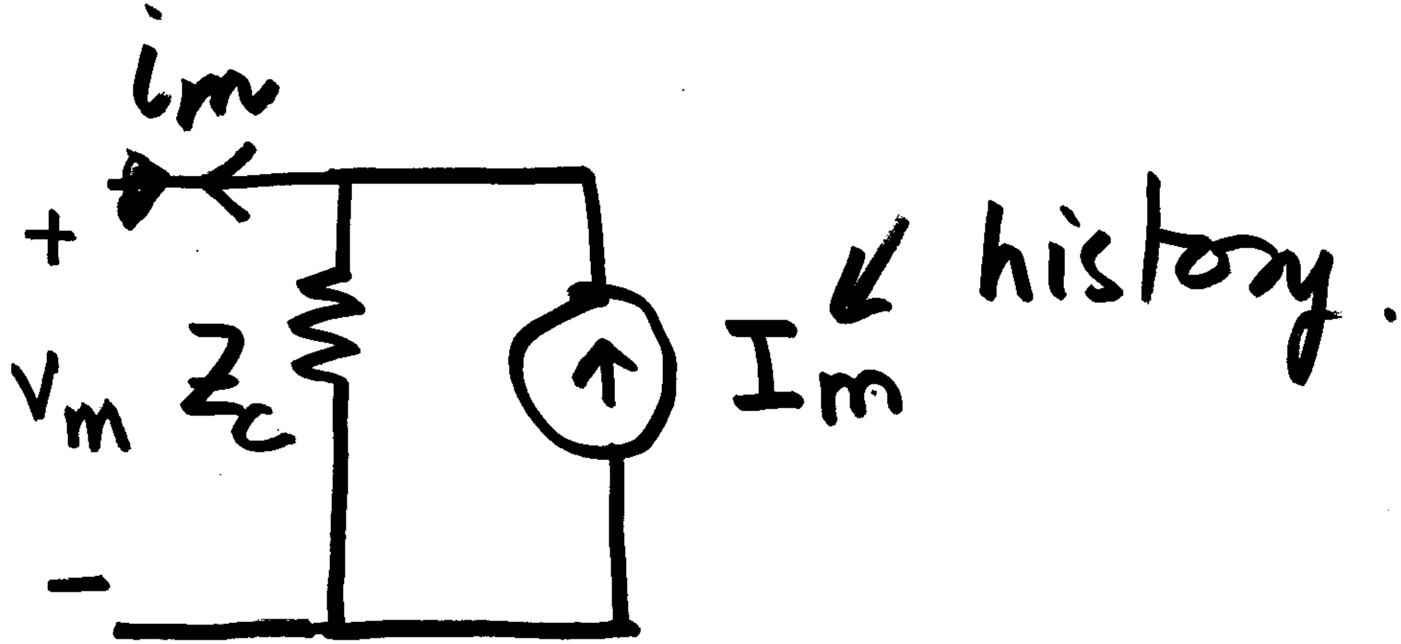
$\frac{d}{c}$

$$I_m = i_k\left(t - \frac{d}{c}\right) + \frac{1}{Z_c} V_k\left(t - \frac{d}{V_p}\right)$$

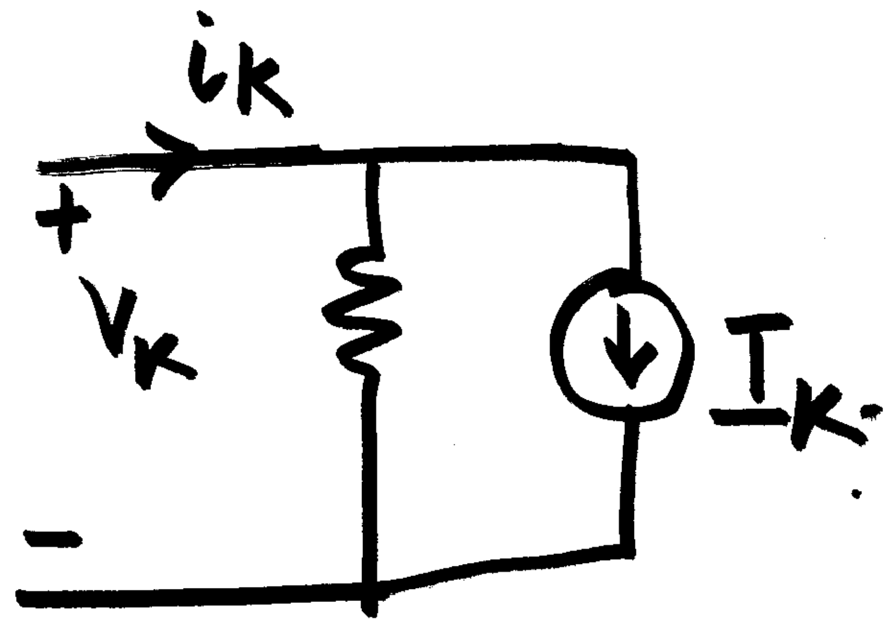
$$i_k(t) = \frac{v_m(t)}{Z_c} + I_k$$

'V_p' is the same as 'c' (velocity of propagation)

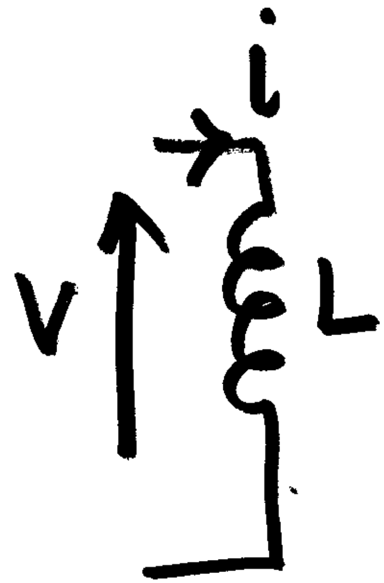
$$I_k = i_m\left(t - \frac{d}{c}\right) - \frac{1}{Z_c} V_m\left(t - \frac{d}{c}\right)$$



i_m
+
V_m
Z_c
I_m
history.
−



i_k
+
V_k
I_k
−



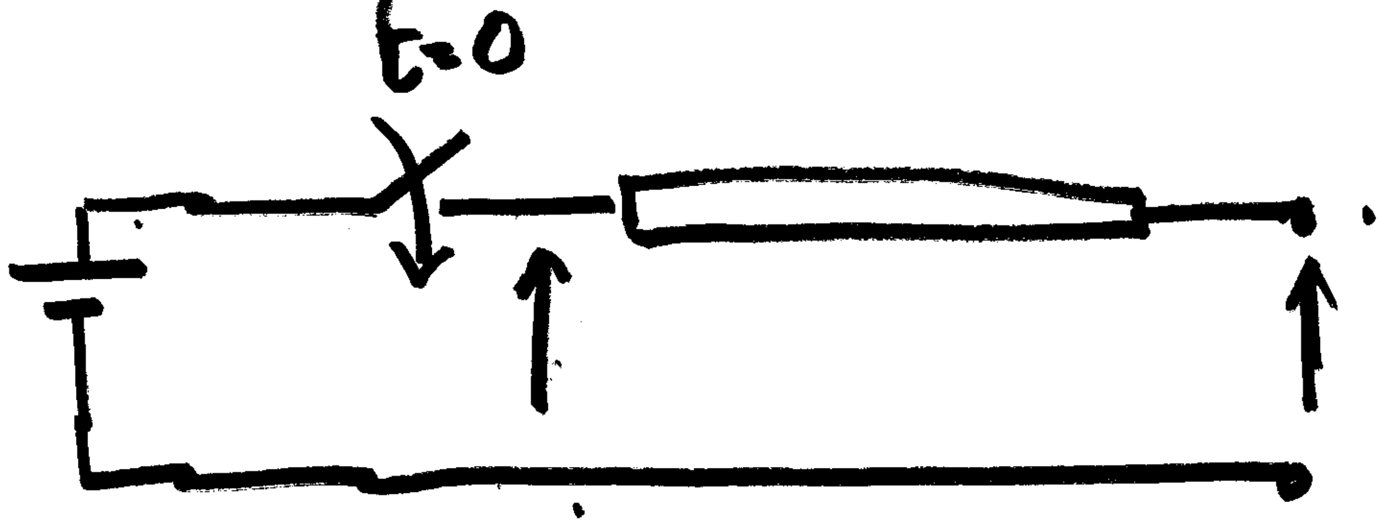
$$\left(\frac{d}{c}\right)$$

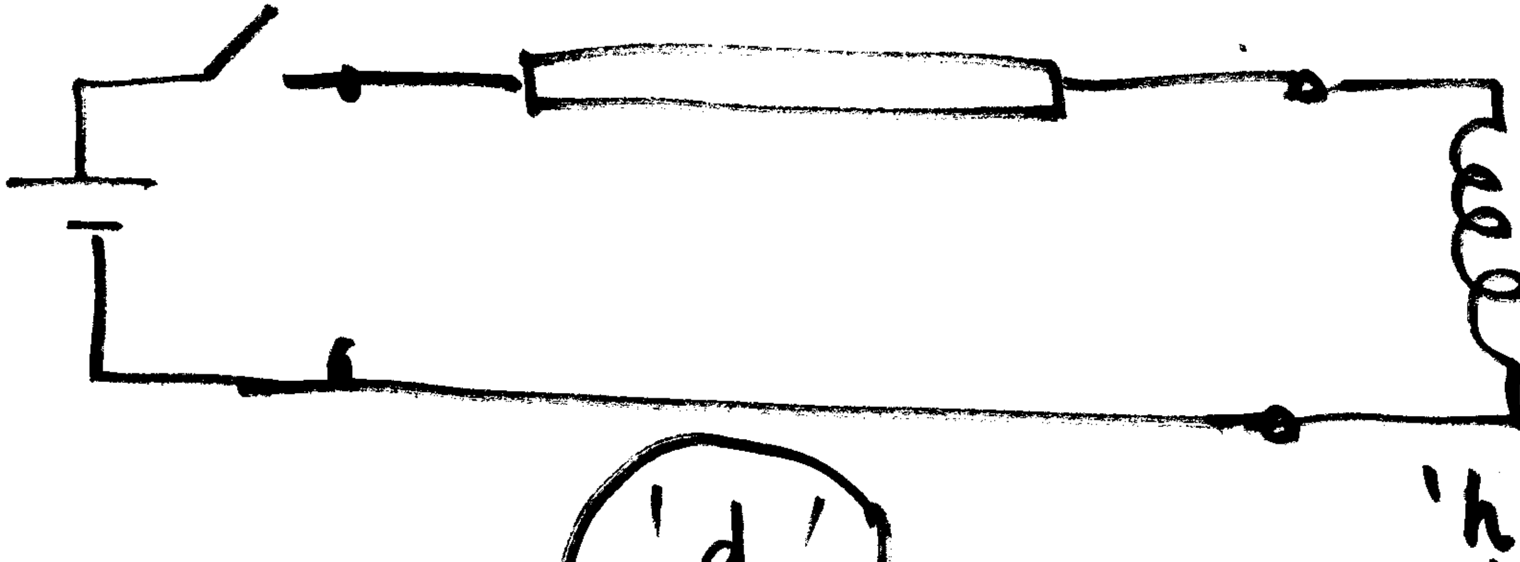
$$L\frac{di}{dt} = V$$

$$L\left\{\frac{i((k+1)\cdot h) - i(k\cdot h)}{h}\right\} = \frac{1}{2}\left[V((k+1)\cdot h) + V(k\cdot h)\right]$$

$$\frac{d}{c} = h.$$

'$\underline{\underline{h}}$'





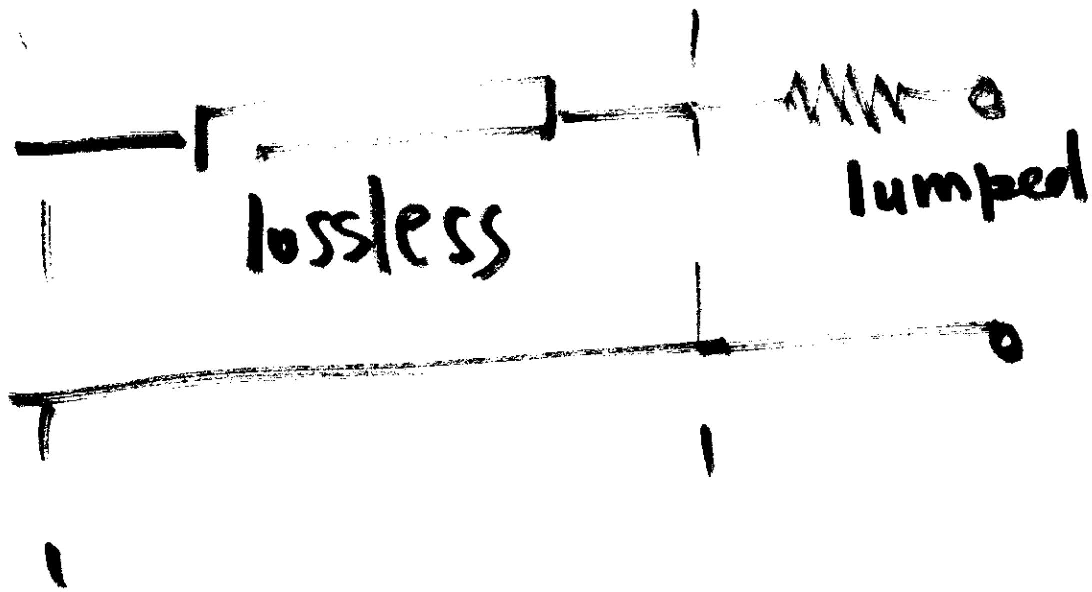
$\frac{'d'}{c}$

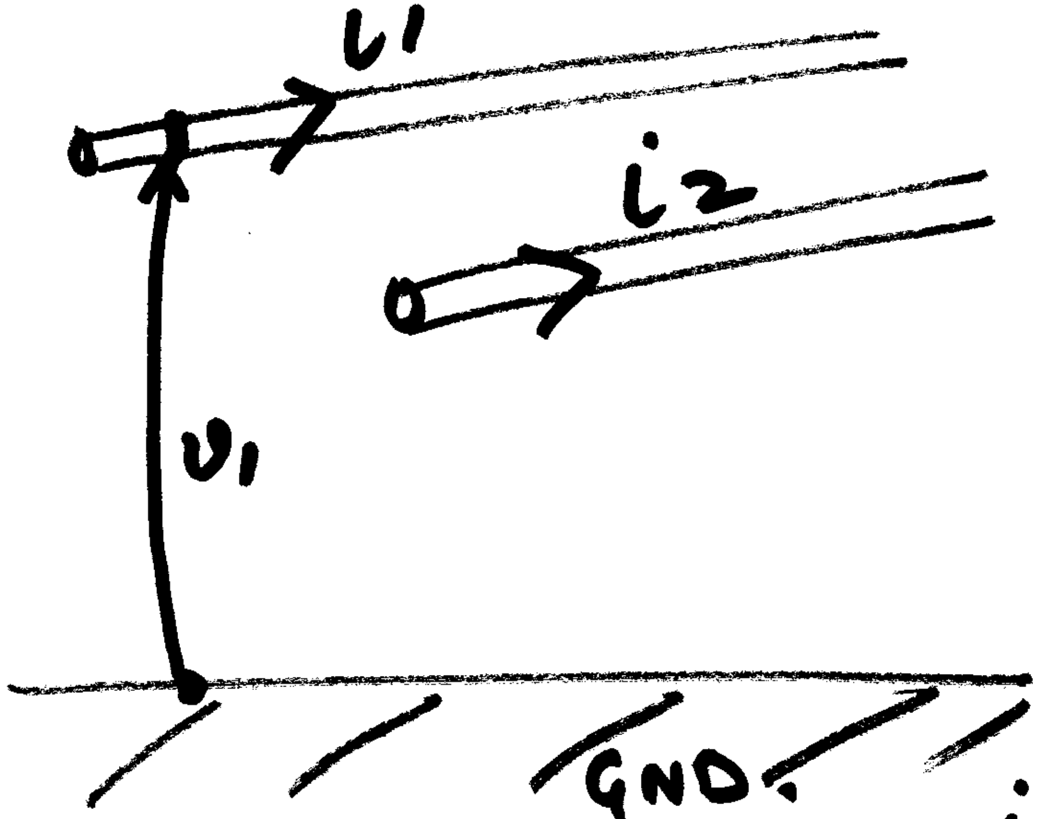
?

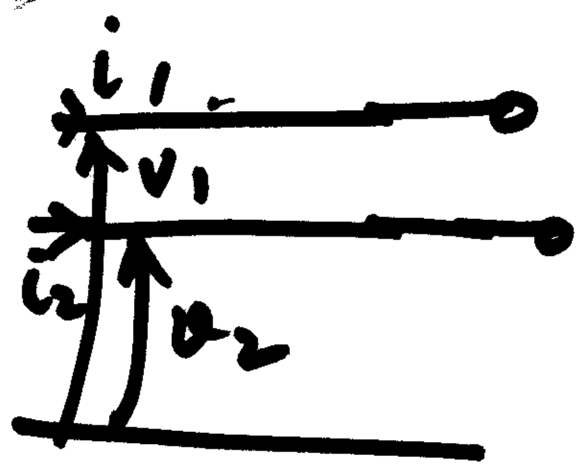
$$\frac{d}{c} \neq kh$$

$\approx$

!


lossless
lumped





$$\begin{bmatrix} \dfrac{\partial v_1}{\partial t} \\ \dfrac{\partial v_2}{\partial t} \end{bmatrix}$$

$$v_{diff} = v_1 - v_2.$$

$$v_{cm} = \frac{v_1 + v_2}{2}.$$

$$i_{diff} = i_1 - i_2.$$

$$i_{cm} = \frac{i_1 + i_2}{2}$$

$$\begin{bmatrix} C_s & C_m \\ C_m & C_s \end{bmatrix} \begin{bmatrix} \dfrac{\partial v_1}{\partial t} \\ \dfrac{\partial v_2}{\partial t} \end{bmatrix} = \begin{bmatrix} \dfrac{\partial i_1}{\partial x} \\ \dfrac{\partial i_2}{\partial x} \end{bmatrix}.$$

$$\underline{i_g = (i_1 + i_2)}$$

$$\begin{bmatrix} L_s & L_m \\ L_m & L_s \end{bmatrix} \begin{bmatrix} \frac{\partial i_1}{\partial t} \\ \frac{\partial i_2}{\partial t} \end{bmatrix} = \begin{bmatrix} \frac{\partial v_1}{\partial x} \\ \frac{\partial v_2}{\partial x} \end{bmatrix}$$

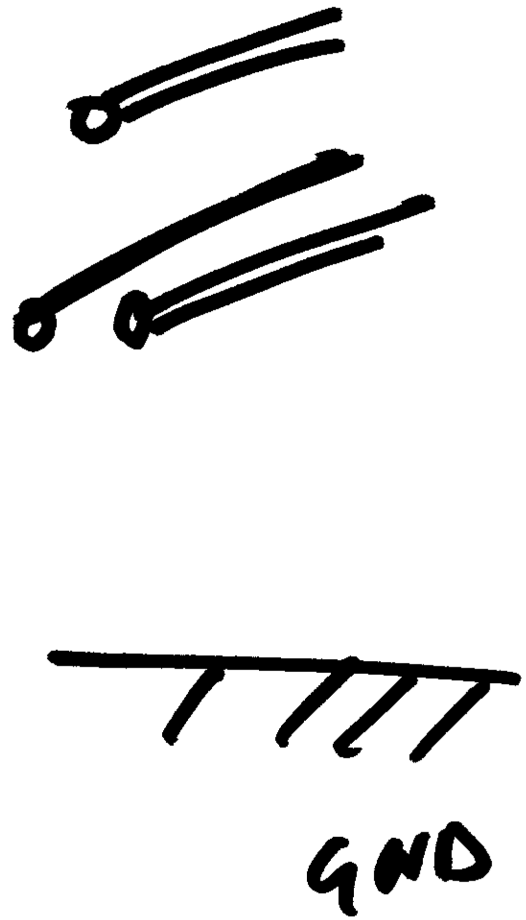
$$\begin{bmatrix} L_s - L_m & 0 \\ 0 & L_s + L_m \end{bmatrix} \begin{bmatrix} \frac{\partial i_{diff}}{\partial t} \\ \frac{\partial i_{com}}{\partial t} \end{bmatrix} = \begin{bmatrix} \frac{\partial v_{diff}}{\partial x} \\ \frac{\partial v_{com}}{\partial x} \end{bmatrix}$$

diagonal

i_{diff}, v_{diff}

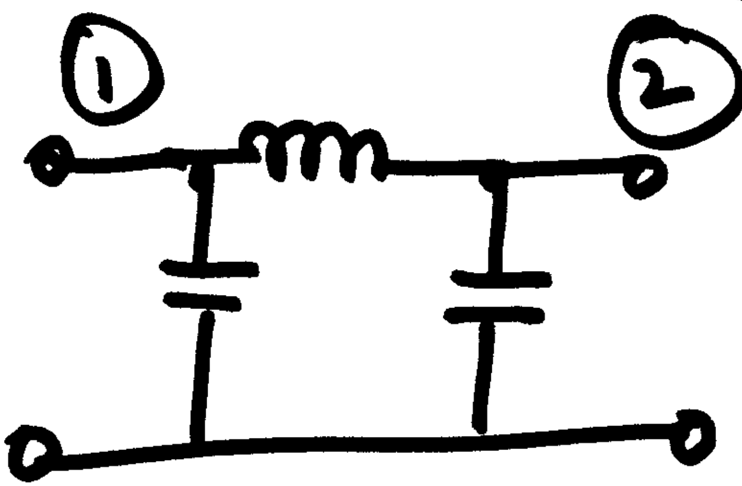
v_{com}, i_{com} .

$$\begin{bmatrix} C_g - C_m & 0 \\ 0 & C_g + C_m \end{bmatrix} \begin{bmatrix} \frac{\partial v_{diff}}{\partial t} \\ \frac{\partial v_{com}}{\partial t} \end{bmatrix} = \begin{bmatrix} \frac{\partial i_{diff}}{\partial x} \\ \frac{\partial i_{com}}{\partial x} \end{bmatrix}$$


GND

$L \cdot$

$$\begin{bmatrix} L_s & L_m & L_m \\ L_m & L_s & L_m \\ L_m & L_m & L_s \end{bmatrix} \begin{bmatrix} \frac{di_a}{dt} \\ \frac{di_b}{dt} \\ \frac{di_c}{dt} \end{bmatrix} = \begin{bmatrix} V_{a1} - V_{a2} \\ V_{b1} - V_{b2} \\ V_{c1} - V_{c2} \end{bmatrix}$$



$C_p(\theta)$

$$L \frac{d\underline{i}^{abc}}{dt} = \underline{V}_1^{abc} - \underline{V}_2^{abc}$$

$$\frac{dC_p}{dt} \cdot i^{dq0} + L C_p \frac{di^{dq0}}{dt} = C_p V_1^{dq0} - C_p V_2^{dq0}.$$

$$\therefore (\,) + \underline{\underline{C_p^{-1} L C_p}} \frac{di^{dq0}}{dt} = V_1^{dq0} - V_2^{dq0}$$

$$\begin{bmatrix} L_s-L_m & 0 & 0 \\ 0 & L_s-L_m & 0 \\ 0 & 0 & L_s+2L_m \end{bmatrix} \begin{bmatrix} \frac{di_d}{dt} \\ \frac{di_q}{dt} \\ \frac{di_o}{dt} \end{bmatrix}$$

$$L' \quad = \begin{bmatrix} V_{d1} - V_{d2} \\ V_{q1} - V_{q2} \\ V_{o1} - V_{o2} \end{bmatrix} + L' \begin{bmatrix} 0 & -\omega \\ +\omega & 0 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} i_d \\ i_q \\ i_o \end{bmatrix}$$