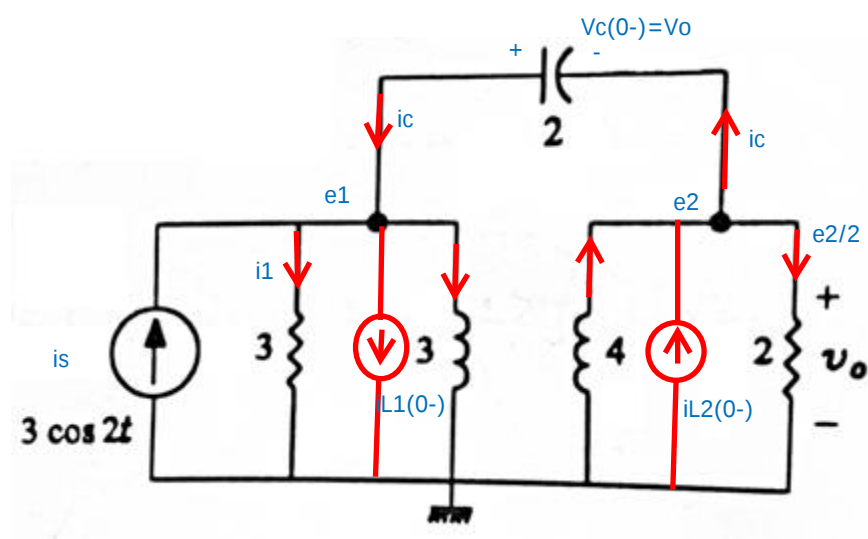


$$Y_n(D).e = i_s$$



$$i_c = -C dv_c / dt$$

$$\begin{bmatrix} 1/3 + 2D + 1/(3D) \\ -2D \end{bmatrix} \begin{bmatrix} e1 \\ e2 \end{bmatrix} = \begin{bmatrix} 3 \cos(2t) - i_{L1}(0-) \\ i_{L2}(0-) \end{bmatrix}$$

$$\begin{aligned} e1(0+) &= R1 \cdot i1(0+) \\ &= 3 \cdot \{i_s(0+) - i_{L1}(0+) + i_c(0+)\} \end{aligned} \quad 1$$

$$\begin{aligned} i_{L1}(0+) &= i_{L1}(0-) \\ i_c(0+) &= i_{L2}(0-) - e2(0+)/2 \end{aligned} \quad 2$$

$$e1(0+) = ?$$

2 in 1 --->

$$e1(0+) = 3 \cdot \{3 - i_{L1}(0+) + [i_{L2}(0-) - e2(0+)/2]\} \quad 3$$

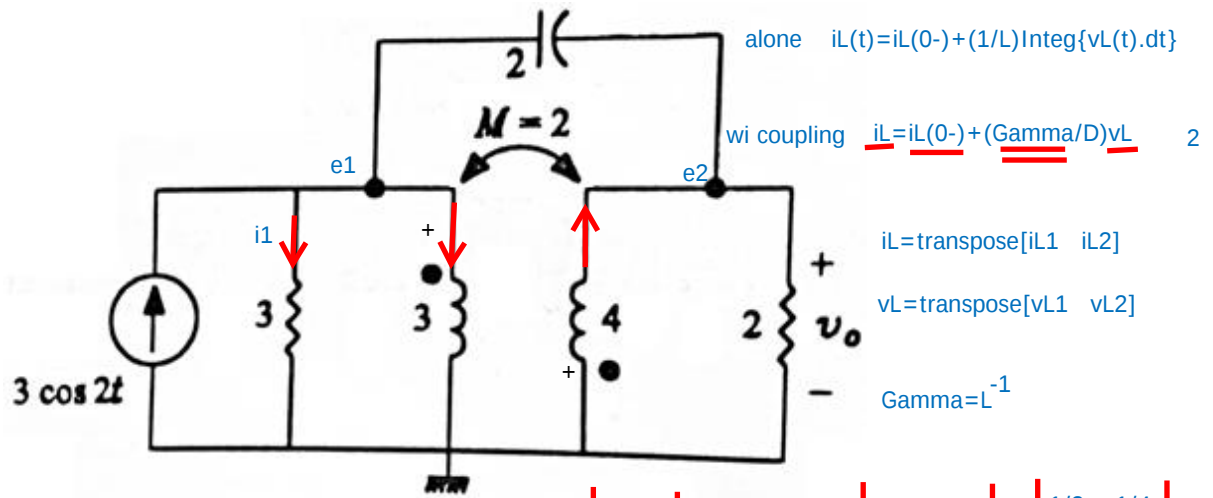
$$e2(0+) = ?$$

$$e1(0+) = v_c(0+) + e2(0+) \quad 4$$

$$v_c(0+) = v_c(0-) \quad 5$$

$$e1(0+) = v_c(0-) + e2(0+) \quad 6$$

$$Y_n(D) \cdot e = i_s$$



$$\begin{bmatrix} 1/3 + 2D & -2D \\ -2D & 1/2 + 2D \end{bmatrix} \begin{bmatrix} e1 \\ e2 \end{bmatrix} = \begin{bmatrix} 3\cos(2t) - i_{L1} \\ i_{L2} \end{bmatrix}$$

$$L = \begin{bmatrix} 3 & 2 \\ 2 & 4 \end{bmatrix} \quad \text{Gamma} = \begin{bmatrix} 4/8 & -2/8 \\ -2/8 & 3/8 \end{bmatrix} = \begin{bmatrix} 1/2 & -1/4 \\ -1/4 & 3/8 \end{bmatrix}$$

$$v_L = \begin{bmatrix} e1 \\ -e2 \end{bmatrix}$$

2 in 1 ----> Node equations

$$e1(0+) = v_c(0+) + e2(0+)$$

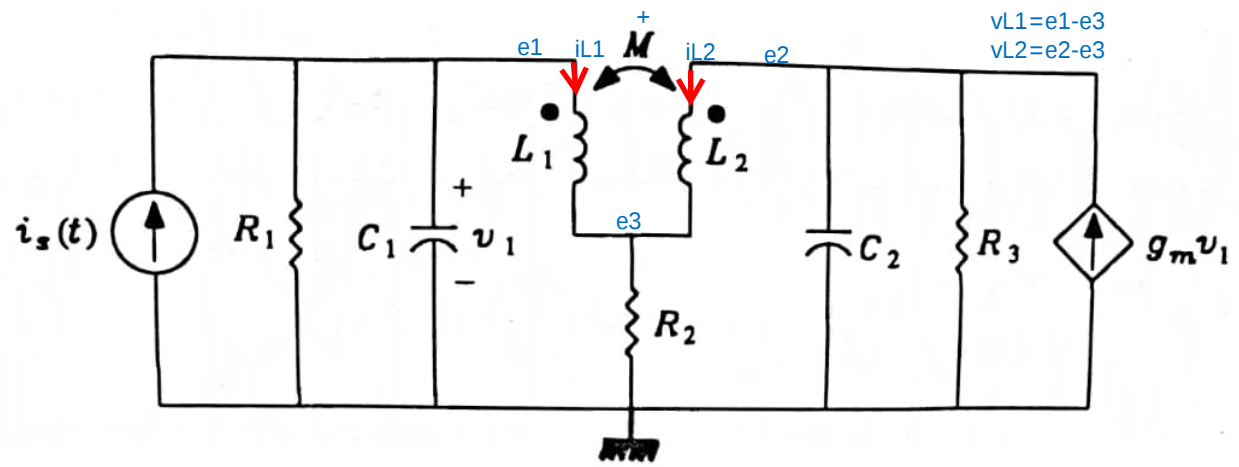
$$e1(0+) = R1 \cdot i1(0+) = 3 \cdot \{i_s(0+) - i_{L1}(0+) + i_c(0+)\}$$

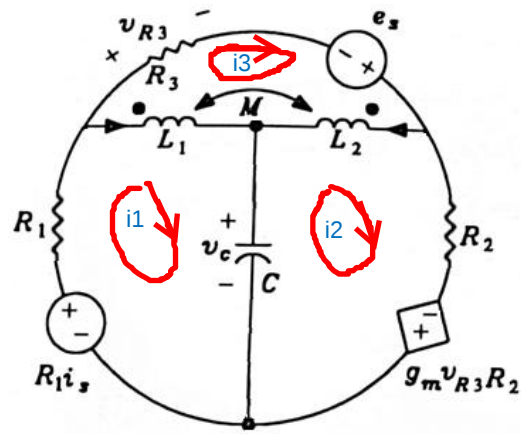
$$i_{L1}(0+) = i_{L1}(0^-)$$

$$i_{L2}(0+) = i_{L2}(0^-)$$

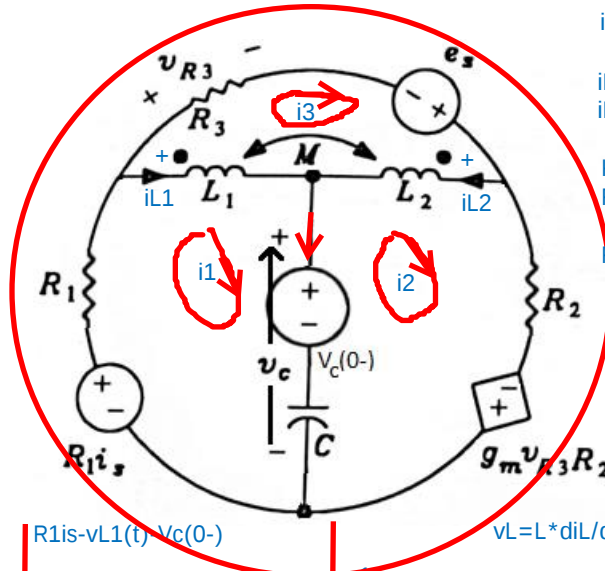
$$i_{L1}(0+) \sim i_{L1}(0^-) \quad \{\text{due to coupling \& impulse}\}$$

$$i_L = i_L(0^-) + (\text{Gamma}/D) v_L$$





$$Z(D).i=vs$$



$$i1(0+), i2(0+), i3(0+) = ?$$

$$iL1(0+)=i1(0+)-i3(0+)=iL1(0-) \quad a$$

$$iL2(0+)=i3(0+)-i2(0+)=iL2(0-) \quad b$$

KVL large loop:

$$R1is+es+gm vR3R2=R1i1+R2i2+R3i3$$

$$R1is+es+gmR3i3R2=R1i1+R2i2+R3i3 \quad c$$

$$\begin{bmatrix} R1+1/(CD) & -1/(CD) & 0 \\ -1/(CD) & 1/(CD)+R2 & 0 \\ 0 & 0 & R3 \end{bmatrix} \begin{bmatrix} i1 \\ i2 \\ i3 \end{bmatrix} = \begin{bmatrix} R1is-vL1(t)-Vc(0-) \\ Vc(0-)+vL2(t)+gm*vR3*R2 \\ es+vL1(t)-vL2(t) \end{bmatrix}$$

$$vL=L*diL/dt$$

$$vL1=L11diL1/dt+L12diL2/dt \quad 2 \quad vR3=R3*i3$$

$$vL2=L21diL1/dt+L22diL2/dt$$

$$(M=L21=L12; L11=L1; L22=L2)$$

$$\begin{bmatrix} R1is-L1diL1/dt-MdiL2/dt-Vc(0-) \\ Vc(0-)+MdiL1/dt+L2diL2/dt+gm*R3*i3*R2 \\ es+L1diL1/dt+MdiL2/dt-MdiL1/dt-L2diL2/dt \end{bmatrix} \quad 1' \quad (2 \text{ in } 1) \quad \begin{matrix} iL1=i1-i3 \\ iL2=i3-i2 \end{matrix} \quad 3$$

$$\begin{bmatrix} R1is-L1d(i1-i3)/dt-Md(i3-i2)/dt-Vc(0-) \\ Vc(0-)+Md(i1-i3)/dt+L2d(i3-i2)/dt+gm*R3*i3*R2 \\ es+L1d(i1-i3)/dt+Md(i3-i2)/dt-Md(i1-i3)/dt-L2d(i3-i2)/dt \end{bmatrix} \quad 1''$$

$$-L1d(i1-i3)/dt=-L1*D*(i1-i3)=-L1Di1+L1Di3$$

$$\begin{bmatrix} R1+1/(CD)+L1D & -1/(CD) & -L1D \\ -1/(CD) & 1/(CD)+R2 & 0 \\ 0 & 0 & R3 \end{bmatrix}$$