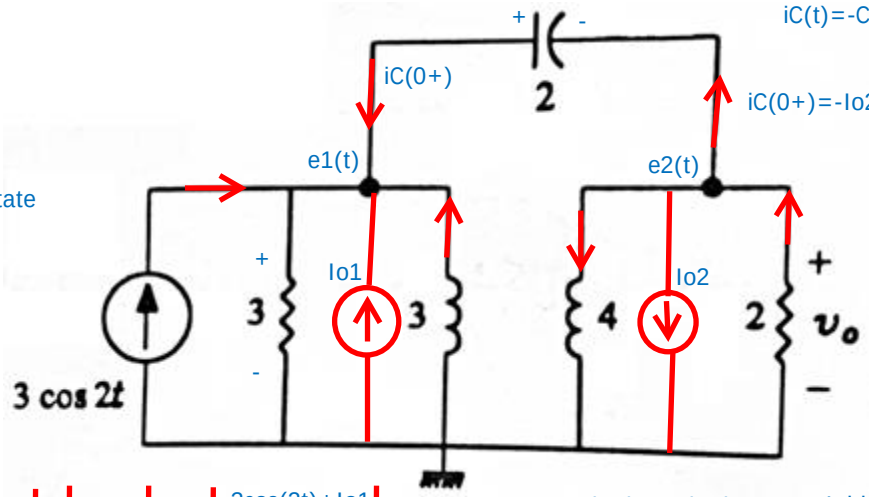
Integro-Diferential Eq.

Yn(D).e=is

iC(t)=-CdvC(t)/dt



iC(0+)=-Io2-e2(0+)/2

iL1(0-)=Io1
iL2(0-)=Io2

Initial state

vC(0-)=Vo

vC(0+)=vC(0-)

iL1(0+)=iL1(0-)=Io1
iL2(0+)=iL2(0-)=Io2

$$\begin{vmatrix} 1/3+2D+1/(3D) & -2D \\ -2D & 2D+1/2+1/(4D) \end{vmatrix} \begin{vmatrix} e1 \\ e2 \end{vmatrix} = \begin{vmatrix} 3\cos(2t)+Io1 \\ -Io2 \end{vmatrix}$$

e1(0+), e2(0+)=? Initial value (0+)

e1(0+)=vC(0+)+e2(0+) 1

e1(0+)=3*{3+iC(0+)+Io1}
=3*{3+Io1-Io2-e2(0+)/2

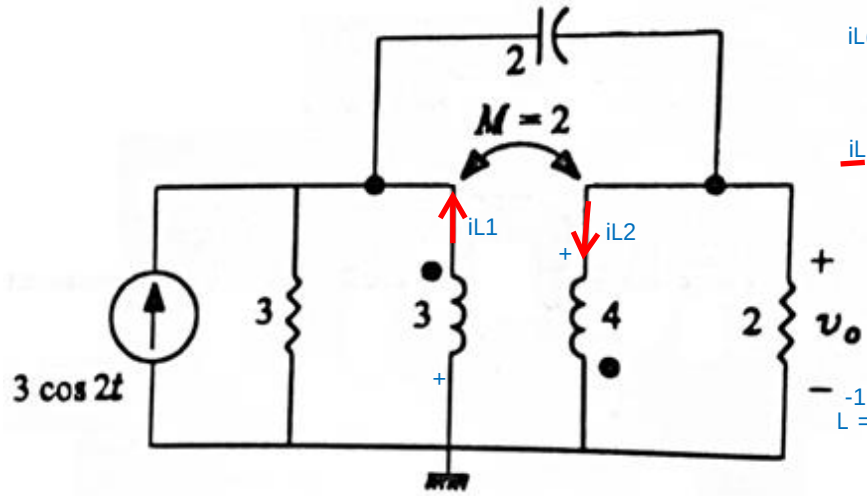
e1(0+)=3*{3+Io1-Io2-e2(0+)/2 2

Integro-Diferential Eq.

Yn(D).e=is

iL1(0-)=Io1
iL2(0-)=Io2

vC(0-)=Vo



iL(t)=iL(0-)+(1/L)Integ{vL(t)dt}

iL=iL(0-)+{Gamma/D}.vL 4

$$L=\begin{vmatrix} 3 & 2 \\ 2 & 4 \end{vmatrix}$$

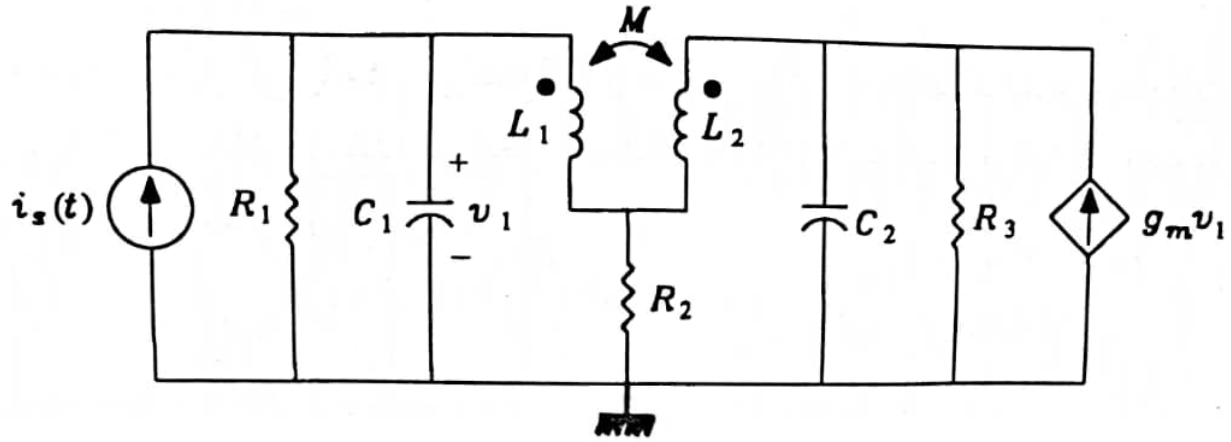
$$L^{-1}=\text{Gamma}=\begin{vmatrix} 4/8 & -2/8 \\ -2/8 & 3/8 \end{vmatrix}$$

$$\begin{vmatrix} 1/3+2D & -2D \\ -2D & 2D+1/2 \end{vmatrix} \begin{vmatrix} e1 \\ e2 \end{vmatrix} = \begin{vmatrix} 3\cos(2t)+iL1 \\ -iL2 \end{vmatrix} \quad 1$$

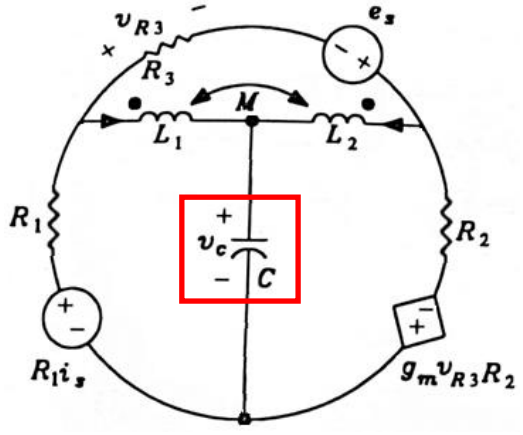
vL1=-e1
vL2=e2 5

$$\text{Gamma/D}=\begin{vmatrix} 1/(2D) & -1/(4D) \\ -1/(4D) & 3/(8D) \end{vmatrix} \quad 3$$

3 & 2 & 5 in 4 ---> iL in 1 -----> Integro-Diff Eq.


M
L_1
L_2
$i_s(t)$
R_1
C_1
+
v_1
−
R_2
C_2
R_3
$g_m v_1$

Integro-Diff Eq. in Mesh Analysis



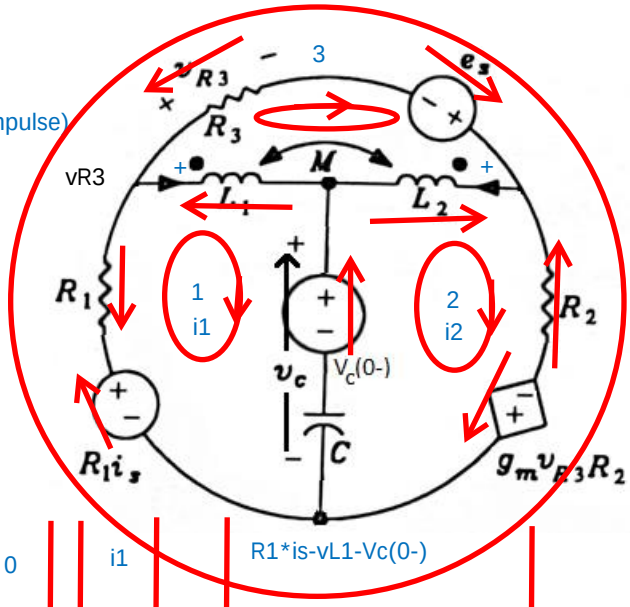
Zl(D).i=es

a in b & c -------> Initial value

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

a iL1(0+)=iL1(0-) Continuity (no impulse)
iL2(0+)=iL2(0-)

b iL1(0+)=i1(0+)-i3(0+)
iL2(0+)=i3(0+)-i2(0+)



KVL largest loop:

R1*is+es+gm*vR3*R2=
vR3+R1*i1+R2*i2
=R3*i3+R1*i1+R2*i2

----> R1*is+es+gm*R3*i3*R2=
=R3*i3+R1*i1+R2*i2 c

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

vL=LdiL/dt=LD*iL

vL=L.D*iL 2

$$LD=\begin{vmatrix} L1D & MD \\ MD & L2D \end{vmatrix} \quad 3$$

$$iL=\begin{vmatrix} iL1 \\ iL2 \end{vmatrix}=\begin{vmatrix} i1-i3 \\ i3-i2 \end{vmatrix} \quad 4$$

4 & 3 in 2

2 in 1 ----> Integro-Diff. Eq.

vR3=R3*i3