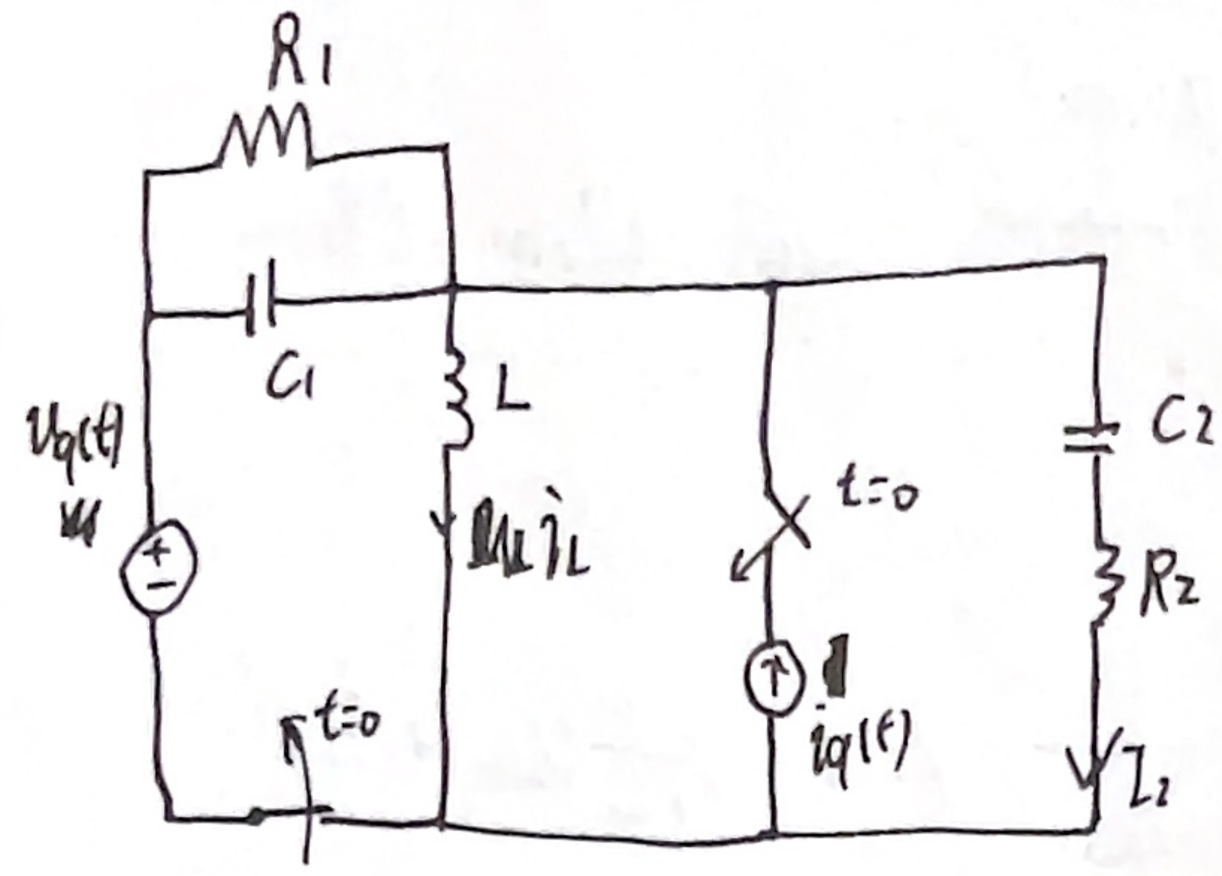
~~[illegible]~~ Laplacebereich

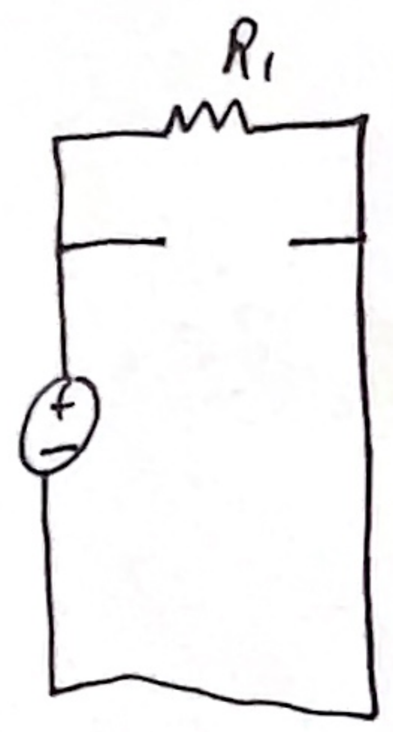


$u_q(t) = U_0$

$i_q(t) = I_0\,\varepsilon(t)$

$t<0$, eingeschwungen

a. $i_2(t)$, $i_L(0^-)$, $u_{C1}(0^-)$, $u_{C2}(0^-)$, $t<0$

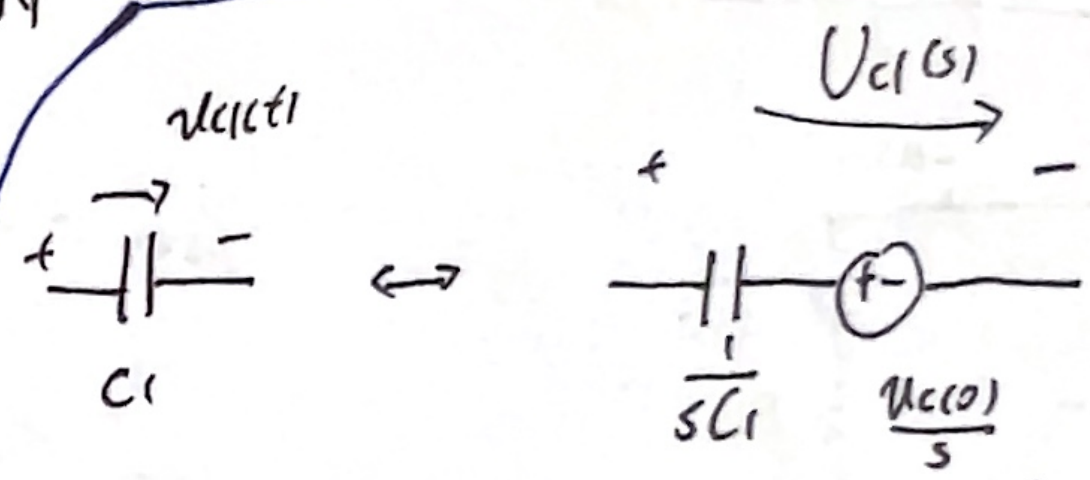


eingeschwungen, $u_{C1}(0^-) = u_0 = U_0$

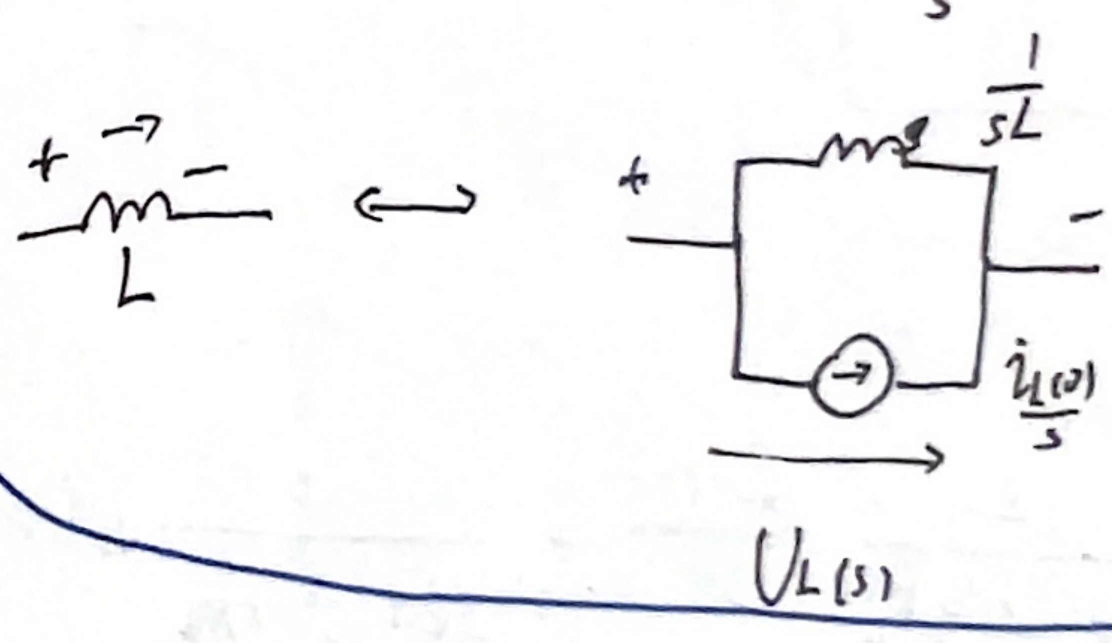
$u_{C2}(0^-) = 0$

$i_2(0^-) = 0$

$i_L(0^-) = \frac{U_0}{R_1}$

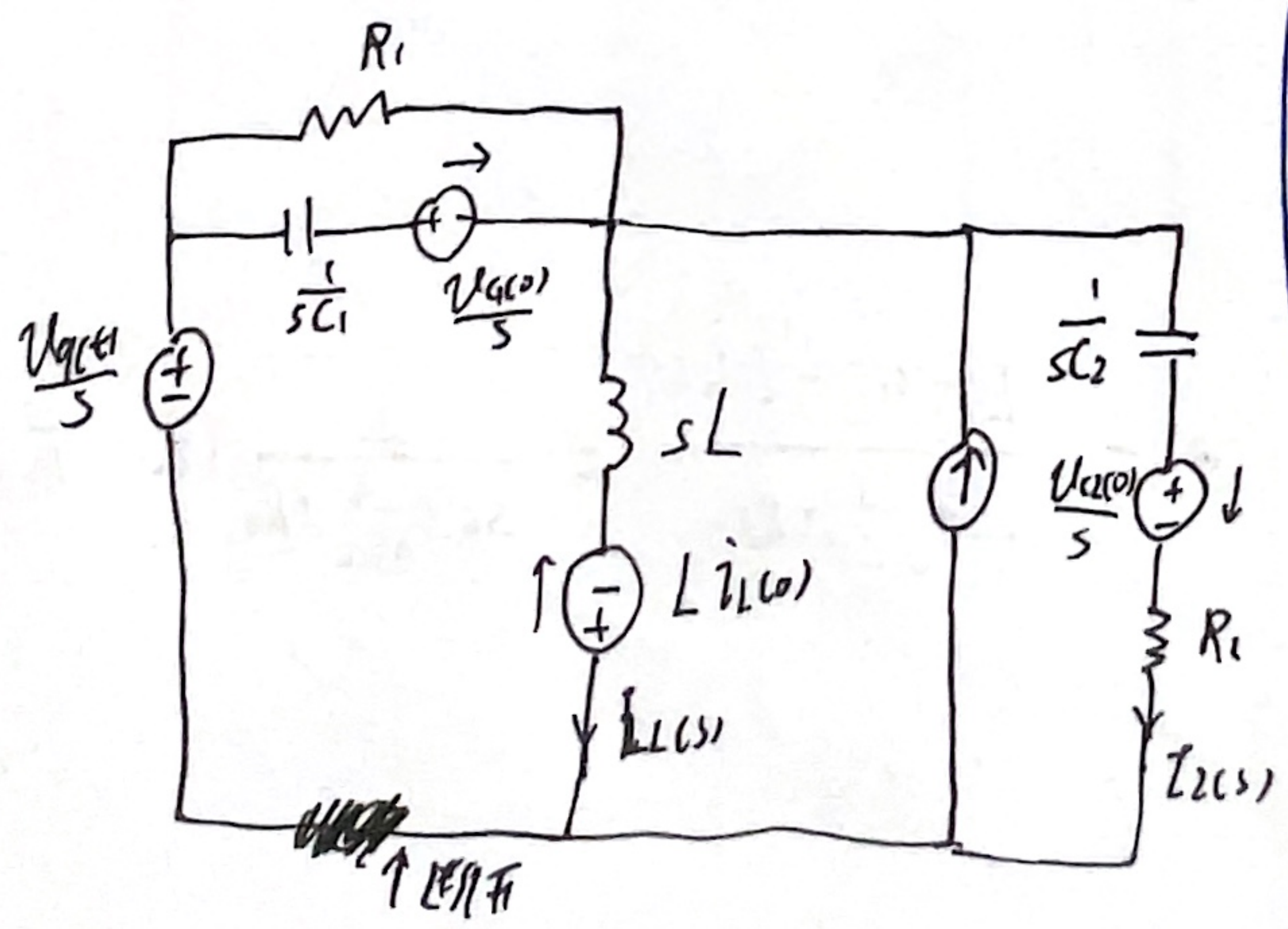


$U_C(s) = \frac{1}{sC_1}\cdot I + \frac{u_C(0)}{s}$

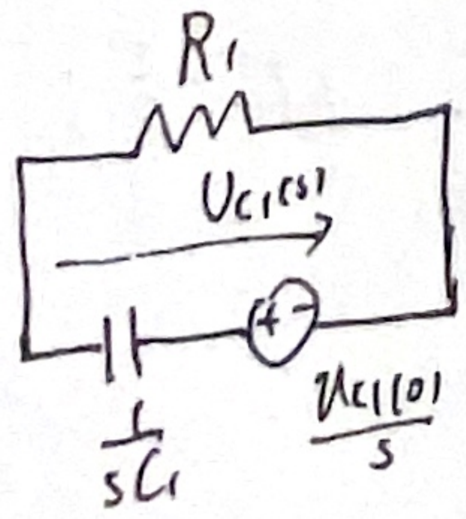


$I_L(s) = \frac{1}{sL} U_L(s) + \frac{i_L(0)}{s}$

b. 变换到 Laplacebereich, $t>0$



c. $u_{C1}(t)$, $t>0$



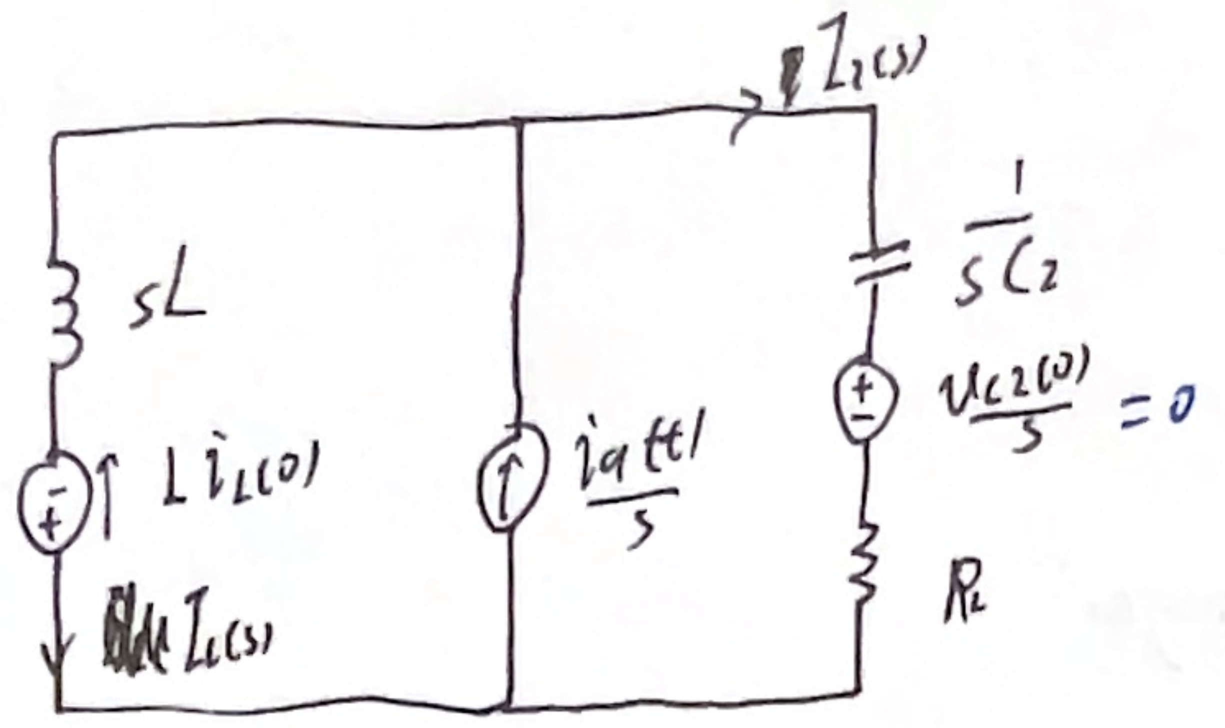
$$U_{C1}(s) = U_{R1}(s) = \frac{R_1}{R_1 + \frac{1}{sC_1}}\,\frac{u_{C1}(0)}{s} = \frac{sR_1C_1}{1+sR_1C_1}\,\frac{u_{C1}(0)}{s} = \frac{R_1C_1}{1+sR_1C_1}\,u_{C1}(0)$$

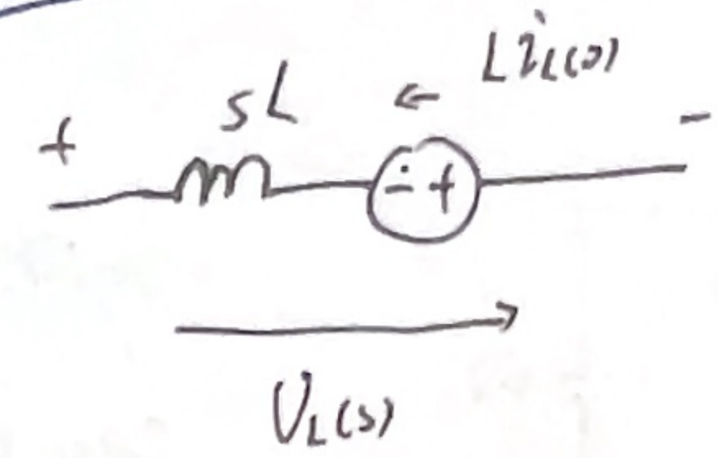
$$= \frac{1}{s+\frac{1}{R_1C_1}}\,u_{C1}(0)$$

$$\frac{1}{s+a} \;\circ\!\!-\!\!\bullet\; e^{-at}\,\varepsilon(t)$$

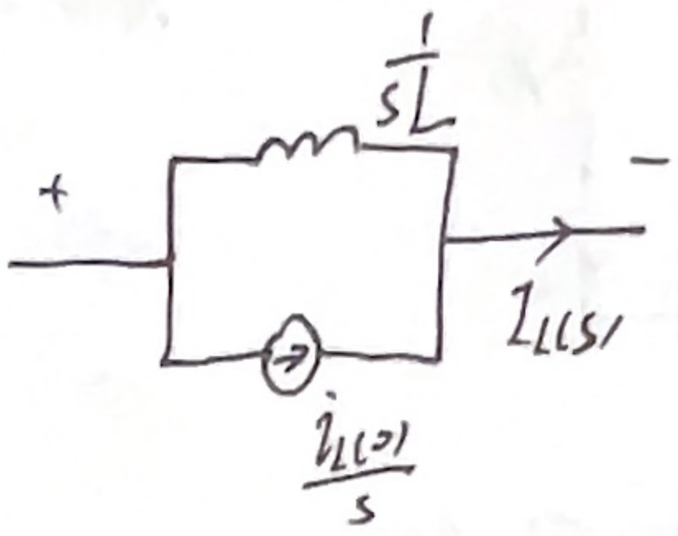
$$\Rightarrow u_{C1}(t) = u_{C1}(0)\, e^{-\frac{t}{R_1C_1}} = U_0\, e^{-\frac{t}{R_1C_1}}, \quad t>0$$

d. $i_2(t)$, $\frac{R_2}{L}=\frac{1}{\tau}$, $LC_2=4\tau^2$

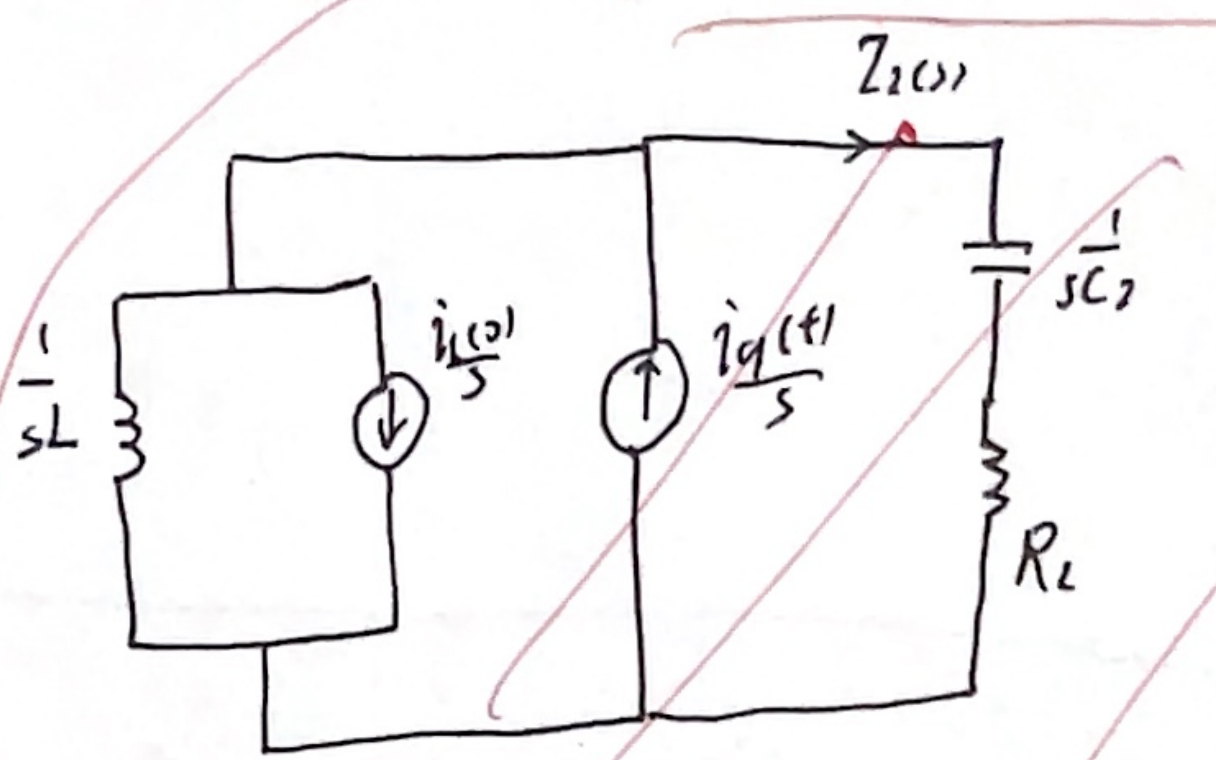




$U_{L(s)} = sLI_{L(s)} - Li_L(0)$

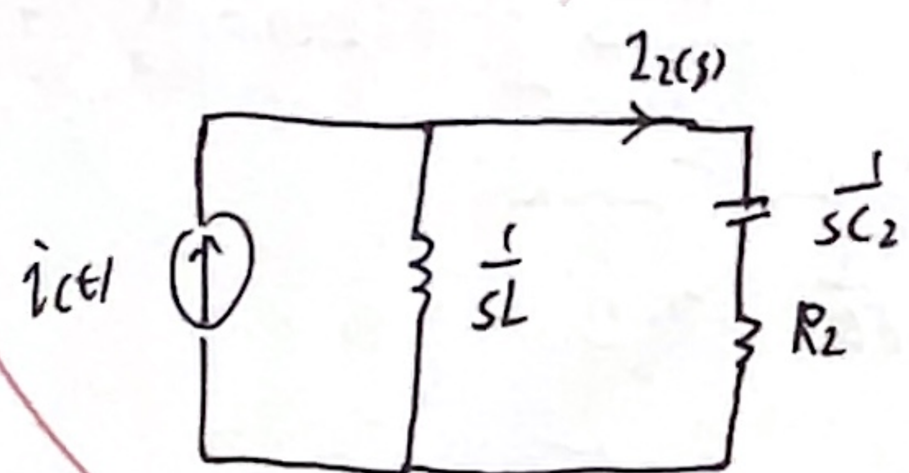


$I_{L(s)} = \frac{1}{sL}U_{L(s)} + \frac{i_L(0)}{s}$



$i(t) = \frac{i_q(t)}{s} - \frac{i_L(0)}{s}$

有问题



$I_2(s) = \frac{\frac{1}{sL}}{\quad}$

$$I_2(s) = \underbrace{\frac{sL}{sL+\frac{1}{sC_2}+R_2}\frac{i_q(t)}{s}}_{\text{并联分流}} - \underbrace{\frac{1}{sL+\frac{1}{sC_2}+R_2}Li_L(0)}_{I=\frac{U}{R}} = \frac{Li_q(t)-Li_L(0)}{sL+\frac{1}{sC_2}+R_2} = \frac{L}{sL+\frac{1}{sC_2}+R_2}\left(I_0-\frac{U_0}{R_1}\right)$$

$$= \frac{sC_2L}{s^2LC_2+sC_2R_1+1}\left(I_0-\frac{U_0}{R_1}\right) = \frac{s}{s^2+s\frac{R_2}{L}+\frac{1}{LC_2}}\left(I_0-\frac{U_0}{R_1}\right) = \frac{s}{s^2+s\frac{1}{\tau}+\frac{1}{4\tau^2}}\left(I_0-\frac{U_0}{R_1}\right)$$

$$= \frac{s}{(s+\frac{1}{2\tau})^2}\left(I_0-\frac{U_0}{R_1}\right)$$

$$\frac{1}{s+\frac{1}{2\tau}} - \frac{1}{2\tau}\frac{1}{(s+\frac{1}{2\tau})^2} \circ\!\!-\!\!\bullet\; e^{-\frac{1}{2\tau}t} - \frac{1}{2\tau}te^{-\frac{1}{2\tau}t}$$

$$\cdots \begin{cases} A_1 = 1 \\ A_2 = -\frac{1}{2\tau} \end{cases}$$

$$i_2(t) = \left(e^{-\frac{1}{2\tau}t} - \frac{1}{2\tau}te^{-\frac{1}{2\tau}t}\right)\left(I_0-\frac{U_0}{R_1}\right)$$