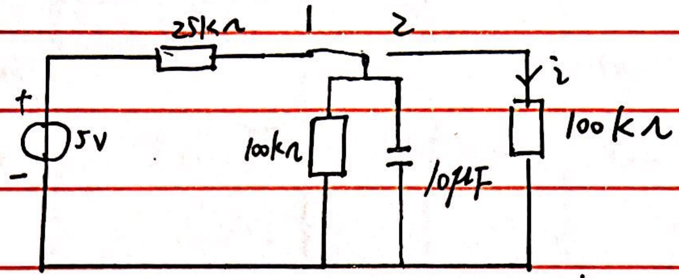
开关S原在1已久，t=0时合向位置2，求$u_c(t)$



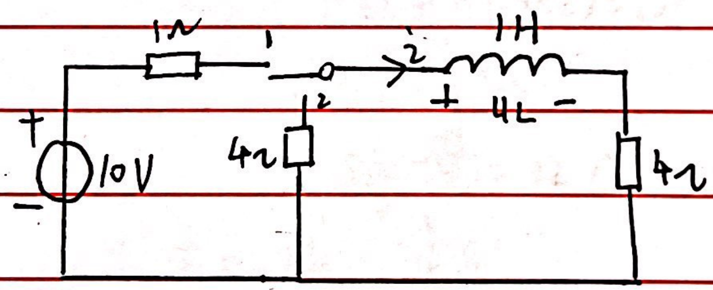
解：$u_c(0_+) = u_c(0_-) = 5\times\frac{4}{5} = 4V$.

t>0时 电容两端的等效电阻为50kΩ.

∴时间常数 $\tau = R_{eq}C = 50\times10^3\times10\times10^{-6} = \frac{1}{2}$

故电容电压为：$u_c(t) = u_c(0_+)\cdot e^{-\frac{t}{\tau}} = 4e^{-2t}V$

开关S在位置1已久，t=0时合向位置2，求换路后的$i(t)$和$u_L(t)$



解：$i(0_+) = i(0^-) = 2A$

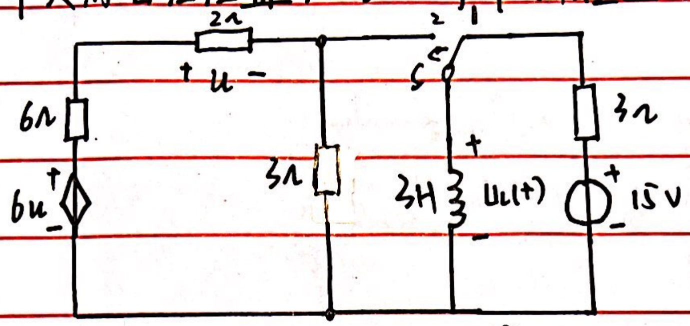
t>0后 电感两端的等效电阻 $R_{eq} = 4+4 = 8Ω$.

故时间常数 $\tau = \frac{L}{R} = \frac{1H}{8} = \frac{1}{8}$

∴ $i(t) = i(0_+)e^{-\frac{t}{\tau}} = 2e^{-8t}A$

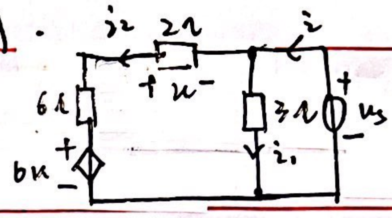
∴ $u_L(t) = L\frac{di}{dt} = L\cdot2\cdot e^{-8t}\cdot(-8) = -16e^{-8t}V$

开关原合在位置1，$t=0$时开关由位置1合向位置2，求电感电压$u_L(t)$



解：$i(0_+)=i(0_-)=\frac{15}{3}=5A$.

$t>0$时等效电阻



$\therefore i_1=\frac{u_s}{3}$ $\quad i_2=i-i_1$

由KVL $\Rightarrow$ $8i_2+6u=u_s$

$\therefore u=-2i_2=-2(i-\frac{u_s}{3})$

$\therefore 8i_2+6(-2i_2)=u_s$

$\therefore 4i=\frac{1}{3}u_s$

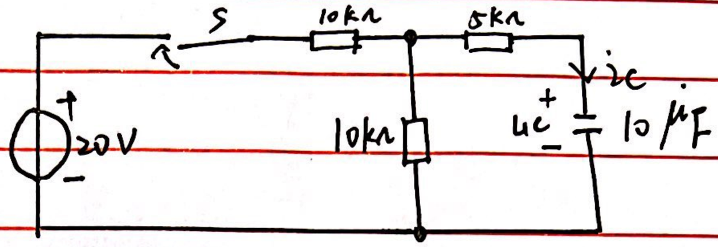
$\therefore R_{eq}=\frac{u_s}{i}=12\Omega$.

$\therefore \tau=\frac{L}{R_{eq}}=\frac{1}{4}s$

$\therefore i_L(t)=5\cdot e^{-4t}A$

$\therefore u_L(t)=L\cdot\frac{di_L}{dt}=-60e^{-4t}V$.

开关S闭合前，电容电压 u_C 为0，在 $t=0$ 时 S闭合，求 $t>0$ 时 $u_C(t)$ 与 $i_C(t)$



解 $u_C(\infty) = 20 \times \frac{1}{2} = 10V$.

$R_{eq} = 5+5 = 10k\Omega$.

$\therefore \tau = R_{eq} \cdot C = 10\times10^3 \times 10\times10^{-6} = \frac{1}{10}s$

$\therefore u_C(t) = 10(1-e^{-10t})V$

$\therefore i_C(t) = C \cdot \frac{du_C(t)}{dt} = 10^{-6} \times 100 \times e^{-10t} = 0.1e^{-10t}\ mA$