7.3，$t=0^-$时，

$$i(0-)=\frac{U}{R_1+R_2}=4A$$

$$u_c(0-)=i(0-)\times R_2=20V$$

$$i(0+)=i(0-)=4A$$

$$u_c(0+)=u_c(0-)=20V$$

7.4，$i_2(0+)=i_2(0-)=2A$

稳定后，R被短路，L_1与L_2均分I_s

$$i_2(\infty)=3A$$

7.5，$u_{c1}(0-)=u_{c2}(0-)=9V$

$t>0$，$i_{c1}+\frac{u_{c1}}{R_1}=i_{c2}+\frac{u_{c2}}{R_2}$

$$C_1\frac{du_{c1}}{dt}+\frac{u_{c1}}{R_1}=C_2\frac{du_{c2}}{dt}+\frac{u_{c2}}{R_2}$$

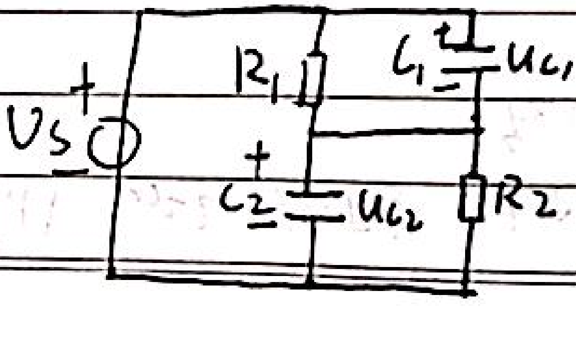
$$\int_{0-}^{0+}\left(C_1\frac{du_{c1}}{dt}+\frac{u_{c1}}{R_1}\right)dt=\int_{0-}^{0+}\left(C_2\frac{du_{c2}}{dt}+\frac{u_{c2}}{R_2}\right)dt$$

$$C_1(u_{c1}(0+)-u_{c1}(0-))=C_2(u_{c2}(0+)-u_{c2}(0-))$$

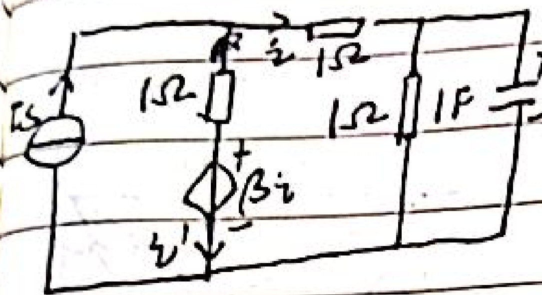
又由 $u_{c1}(0+)+u_{c2}(0+)=U_S=9V$

代入解得 $u_{c1}(0+)=3V$

$u_{c2}(0+)=6V$



7.10. $t<0$ 稳态时



$i\times(1\Omega+1\Omega)-\beta i-(I_s-i)\times 1\Omega=0$

$i=0.4A$

$u(0-)=0.4V$

$u(0+)=0.4V$

换路后 稳态时

$i\times 2-\beta i-(I_s-i)\times 1=0 \quad i=\frac{2}{3}A$

$u_p(t)=\frac{2}{3}V$

$u(t)=u_p(t)+[u(0+)-u_p(0+)]e^{-\frac{t}{\tau}}$

对电容左边电路作戴维宁等效

$U_d=u_p(t)=\frac{2}{3}V$

短路时: $i'\times 1-\beta i'-(I_s-i')\times 1=0$

$i'=2A$

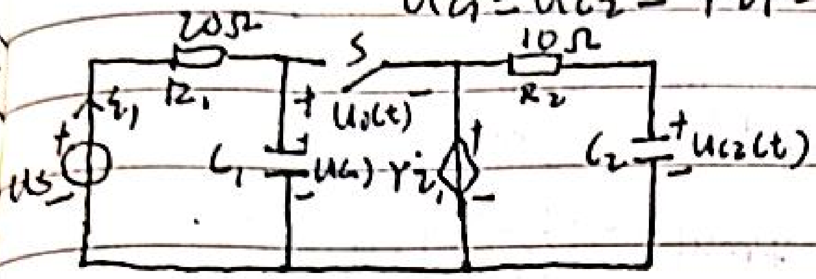
$I_d=2A \quad R_d=\frac{U_d}{I_d}=\frac{1}{3}\Omega$

$\tau=RC=\frac{1}{3}s$

代入 $u(t)=\frac{2}{3}-\frac{4}{15}e^{-3t}$

7.12. $t<0$ 稳态时: $i_1R_1 + ri_1 = U_s$ $i_1 = 0.3A$

$u_{c1} = u_{c2} = ri_1 = 6V$



$i_1R_1 + u_{c1} = U_s$

$C_1R_1\frac{du_{c1}}{dt} + u_{c1} = U_s$

$u_{c1}(0+) = u_{c1}(0-) = 6V$

$u_{c1p} = U_s = 12V$ $\tau = R_1C_1 = 2$

$u_{c1}(t) = 12 - 6e^{-\frac{t}{2}}$

$i_1(t) = C_1\frac{du_{c1}(t)}{t} = 0.3e^{-\frac{t}{2}}$

$ri_1(t) = 6e^{-\frac{t}{2}}$

$u_0(t) = u_{c1}(t) - ri_1(t) = 12 - 12e^{-\frac{t}{2}}$

对右边: $i_2R_2 + u_{c2} = ri_1$

$C_2R_2\frac{du_{c2}}{dt} + u_{c2} = C_1r\frac{du_{c1}}{dt} = 6e^{-\frac{t}{2}}$

解 $\frac{du_{c2}}{dt} + u_{c2} = 6e^{-\frac{t}{2}}$

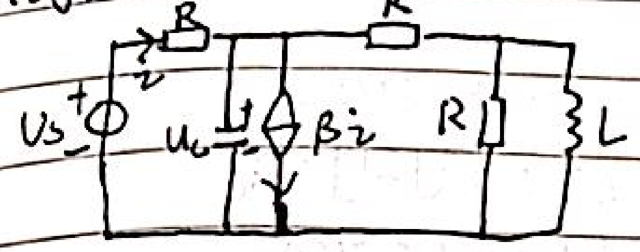
$u_{c2}(t) = e^{-\int dt}\cdot\left[\int 6e^{-\frac{t}{2}}\cdot e^{\int dt}\cdot dt + c\right]$

$= 12e^{-\frac{t}{2}} + ce^{-t}$

$u_{c2}(0+) = 12 + c = 6V$ $c = -6$

故 $u_{c2}(t) = 12e^{-\frac{t}{2}} - 6e^{-t}$

7.28、t<0时

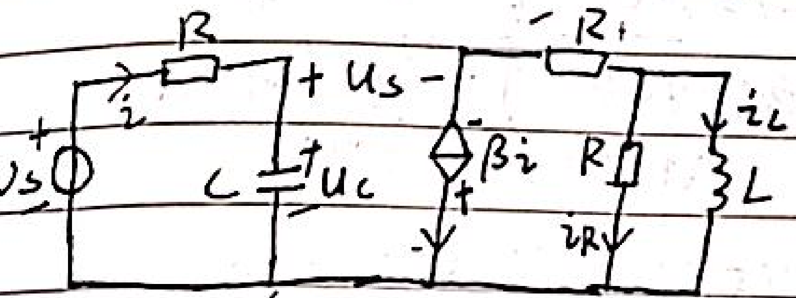


$iR+(i-\beta i)R=U_s$

$i=0.72A$

$i_L(0-)=0.48A$

$u_c(0-)=i_L\cdot R=4.8V$



RL零输入

RC全响应

$u_c(0+)=4.8V$

$u_{cp}(t)=12V \quad \tau=RC=0.1s$

$u_c(t)=12-7.2e^{-10t}$

$i_c(t)=C\frac{du(t)}{dt}=0.72e^{-10t}$

$\beta i=0.24e^{-10t}$

$\beta i+i_R+i_L=0$

$0.24e^{-10t}+\frac{U_L}{R}+i_L=0$

$\frac{L}{R}\frac{di_L(t)}{dt}+i_L(t)=-0.24e^{-10t}$

$\frac{di_L(t)}{dt}+50i_L(t)=-12e^{-10t}$

$i_L(t)=e^{-50t}\cdot\left[\int -12e^{-10t}\times e^{50t}dt+C\right]=-0.3e^{-10t}+Ce^{-50t}$

由$i_L(0+)=-0.3+C=0.48$

$C=0.78A$

故$i_L(t)=-0.3e^{-10t}+0.78e^{-50t}$

$u_L + u_{\beta i} = \beta i R$

$L\frac{di_L(t)}{dt} + u_{\beta i} = 2.4e^{-10t}$

$0.6e^{-10t} - 7.8e^{-50t} + u_{\beta i} = 2.4e^{-10t}$

$u_{\beta i} = 1.8e^{-10t} + 7.8e^{-50t}$

$u_s(t) = u_C(t) + u_{\beta i}(t)$

$= 12 - 5.4e^{-10t} + 7.8e^{-50t}$

故 $u_s(t) = 1.2 - 5.4e^{-10t} + 7.8e^{-50t}$

$i_L(t) = -0.3e^{-10t} + 0.78e^{-50t}$