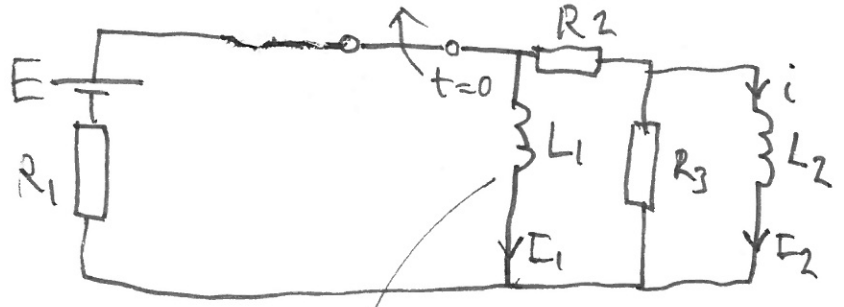
(-15)

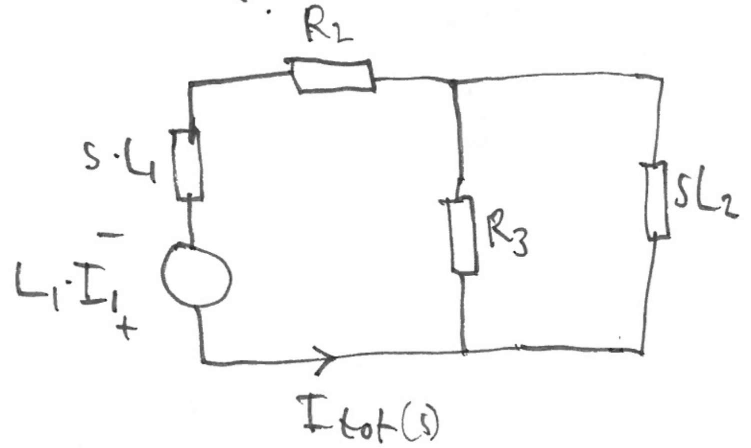


$R_1 = 6\,\Omega$
$R_2 = 6\,\Omega$
$R_3 = 6\,\Omega$
$L_1 = 2\sqrt{2}\,H$
$L_2 = \sqrt{2}\,H$
$E = 12\,V$

$\omega L_1 = 0 \Rightarrow I_2 = 0$ då $t<0$

$I_1 = \frac{E}{R_1} \Rightarrow I_1 = 2\,A$

Operatorschema:



$$I_{tot}(s) = \frac{L_1 I_1}{\frac{sL_2R_3}{sL_2+R_3} + sL_1 + R_2} = \frac{2\sqrt{2}\cdot 2}{\frac{s\cdot\sqrt{2}\cdot 6}{s\cdot\sqrt{2}+6} + 6 + 2\sqrt{2}\cdot s} =$$

$$= \frac{2\sqrt{2}\cdot 2\cdot(s\cdot\sqrt{2}+6)}{s\cdot\sqrt{2}\cdot 6 + (6+2\sqrt{2}\cdot s)\cdot(s\cdot\sqrt{2}+6)} = \frac{8s + 24\sqrt{2}}{s\cdot\sqrt{2}\cdot 6 + 6\cdot\sqrt{2}\cdot s + 36 + 4s^2 + 12\cdot\sqrt{2}\cdot s} =$$

$$= \frac{4\cdot(2s + 6\sqrt{2})}{s\cdot\sqrt{2}\cdot 24 + 4s^2 + 36} = \frac{2\cdot s + 6\sqrt{2}}{s^2 + 6\sqrt{2}\cdot s + 9} = \frac{2\cdot(s+3\sqrt{2})}{(s+3\sqrt{2}-3)(s+3\sqrt{2}+3)}$$

strömdelning:

$$I(s) = -I_{tot}(s)\cdot\frac{R_3}{R_3+sL_2} = -\frac{2\cdot(s+3\sqrt{2})\cdot 6}{(s+3\sqrt{2}-3)(s+3\sqrt{2}+3)\underbrace{(6+\sqrt{2}\cdot s)}_{(s+3\sqrt{2})\cdot\sqrt{2}}}$$

$$= -\frac{6\sqrt{2}\cdot\cancel{(s+3\sqrt{2})}}{(s+3\sqrt{2}-3)(s+3\sqrt{2}+3)\cancel{(s+3\sqrt{2})}}$$

$$= \frac{A}{(s+3\sqrt{2}-3)} + \frac{B}{(s+3\sqrt{2}+3)}$$

(-15 forts.)

$$= \frac{A \cdot s + A \cdot (3\sqrt{2}+3) + B \cdot s + B \cdot (3\sqrt{2}-3)}{(s+3\sqrt{2}-3)(s+3\sqrt{2}+3)}$$

s^1: $\quad A + B = 0 \Rightarrow B = -A$

s^0: $\quad A \cdot (3\sqrt{2}+3) + B \cdot (3\sqrt{2}-3) = -6\sqrt{2} \Rightarrow$

$A \cdot (3\sqrt{2}+3) - A \cdot (3\sqrt{2}-3) = -6\sqrt{2} \Rightarrow$

$\cancel{A \cdot 3\sqrt{2}} + A \cdot 3 - \cancel{A \cdot 3\sqrt{2}} + A \cdot 3 = -6\sqrt{2} \Rightarrow$

$A \cdot 6 = -6 \cdot \sqrt{2} \Rightarrow A = -\sqrt{2}$

$\Rightarrow B = \sqrt{2}$

Således:

$$I(s) = \frac{-\sqrt{2}}{(s+3\sqrt{2}-3)} + \frac{\sqrt{2}}{(s+3\sqrt{2}+3)}$$

$\Rightarrow$

$$i(t) = -\sqrt{2} \cdot e^{(-3\sqrt{2}+3) \cdot t} + \sqrt{2} \cdot e^{(-3\sqrt{2}-3) \cdot t}$$

$$= -2\sqrt{2} \cdot e^{-3\sqrt{2}t} \cdot \underbrace{\left(\frac{e^{3t} - e^{-3t}}{2}\right)}_{\sinh(3t}$$