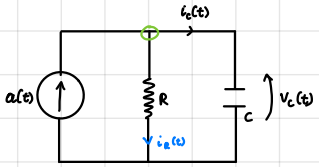
ESERCITAZIONE

ESERCIZIO 1



$v_c(t_0) = V_{c_0}$ per $a(t) = A$ $\quad v_c(t)?$ $\quad i_c(t)?$ $\quad E_c?$

per $a(t) = At$ $\quad v_c(t)?$

- $i_c(t) = A(t) - i_R(t) \rightarrow \frac{dV_c}{dt} = -\frac{1}{RC} V_c(t) + \frac{A(t)}{C} \Rightarrow V_c(t) = K e^{-\frac{1}{RC}(t-t_0)} + V_{c_{1P}}(t)$ $\rightarrow$ $a(t) = A$:

$$\frac{d\gamma}{dt} = -\frac{1}{RC}\gamma + \frac{A}{C} \rightarrow \gamma = AR$$

$$V_c(t) = K e^{-\frac{1}{RC}(t-t_0)} + AR$$

$$V_{c_0} = K e^{-\frac{1}{RC}\cdot 0} + AR \rightarrow K = V_{c_0} - AR$$

$$i_c(t) = A - \frac{V_c(t)}{R} = C\frac{dV_c}{dt}, \qquad E_c = \lim_{t\to\infty} \frac{1}{2} C V_c^2(t) = \lim_{t\to\infty} \frac{1}{2} C A^2 R^2 = \frac{1}{2} CA^2R^2$$

Riprendiamo $\frac{dV_c}{dt} = -\frac{1}{RC} V_c(t) + \frac{At}{C} \rightarrow V_c(t) = K e^{-\frac{1}{RC}(t-t_0)} + V_{c_{1P}}(t) \rightarrow$

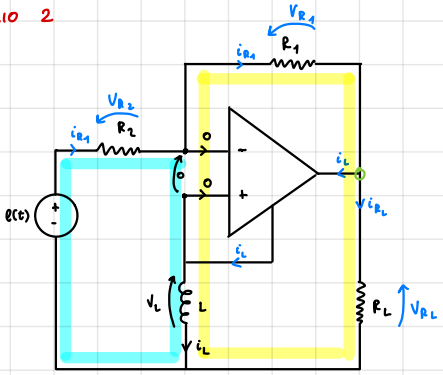
$$\gamma_2 = -\frac{\gamma_1}{RC} - \frac{\gamma_2 t}{RC} + \frac{At}{C}$$

$$\frac{\gamma_1}{RC} + \gamma_2 = \left(-\frac{\gamma_2}{RC} + \frac{A}{C}\right)t \rightarrow \begin{cases} \gamma_1 = -\gamma_2 RC \\ \frac{\gamma_2}{RC} = \frac{A}{C} \end{cases} \rightarrow \begin{cases} \gamma_1 = -AR^2C \\ \gamma_2 = AR \end{cases}$$

$$V_c(t) = K e^{-\frac{1}{RC}(t-t_0)} - AR^2C + ARt$$

$$V_{c_0} = K - AR^2C + ARt_0 \rightarrow K = V_{c_0} + AR^2C - ARt_0$$

ESERCIZIO 2



- $i_{R_L} = i_{R_1} - i_L = \frac{V_{R_2}}{R_2} - i_L = \frac{e(t) - V_L(t)}{R_2} - i_L$
- $V_{R_2} = e(t) - V_L(t)$
- $V_L(t) = V_{R_1} + V_{R_L} = R_1 i_{R_1} + i_{R_L} R_L$

$$V_L(t) = \frac{R_1}{R_2}(e(t) - V_L) + R_L\left(\frac{e(t) - V_L}{R_2} - i_L\right)$$

$$\vdots$$

$$\frac{di_L}{dt} = -\frac{R_2 R_L}{(R_1 + R_2 + R_L)} \cdot \frac{1}{L} i_L + \frac{R_1 + R_L}{R_1 + R_2 + R_L} e(t)$$