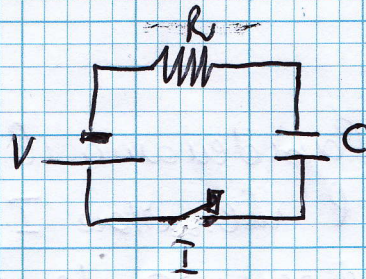


Circuito RC

(6)

Processo di carica
(quando viene chiuso l'interruttore)



$$t_0 = 0$$

$$i_0 = 0$$

$$V - \frac{q}{C} - iR = 0 \Rightarrow V - \frac{q(t)}{C} - \frac{dq(t)}{dt} R = 0$$

$$V - \frac{q(t)}{C} = \frac{dq(t)}{dt} R \Rightarrow \frac{CV - q(t)}{C} dt = dq(t) R$$

$$\int \frac{dt}{RC} = \int \frac{dq(t)}{CV - q(t)} \quad -\frac{1}{RC} t + \cos T = \ln |CV - q(t)|$$

$$CV - q(t) = e^{(-\frac{t}{RC} + \cos T)} \quad e^{\cos T} = k$$

$$CV - q(t) = ke^{-\frac{t}{RC}} \quad \text{essendo } t_0 = 0 \text{ e } q_0 = 0 \text{ si ha } k = CV$$

$$q(t) = CV - ke^{-\frac{t}{RC}} \Rightarrow q(t) = CV(1 - e^{-\frac{t}{RC}})$$

$$i(t) = \frac{dq(t)}{dt} = CV \left(\frac{e^{-\frac{t}{RC}}}{RC} \right) \Rightarrow i(t) = \frac{V}{R} e^{-\frac{t}{RC}}$$

Processo di scarica

$$\frac{q(t)}{C} + i(t)R = 0 \Leftrightarrow \frac{q(t)}{C} = -i(t)R$$

nell'istante $t_0 = 0$
viene aperto l'interruttore
e $q_0 = CV$

$$-\frac{q(t)}{RC} = \frac{dq(t)}{dt}$$

$$\int -\frac{dt}{RC} = \int \frac{dq(t)}{q(t)} \Rightarrow -\frac{1}{RC} t + \cos T = \ln |q(t)|$$

$$q(t) = e^{-\frac{t}{RC} + \cos T}, \quad k = e^{\cos T}, \quad q(t) = ke^{-\frac{t}{RC}} \quad k = CV$$

$$q(t) = CV e^{-\frac{t}{RC}} \quad i(t) = \frac{dq(t)}{dt} = -\frac{CV}{RC} e^{-\frac{t}{RC}} = \frac{V}{R} e^{-\frac{t}{RC}}$$

$$i(t) = \frac{V}{R} e^{-\frac{t}{RC}}$$