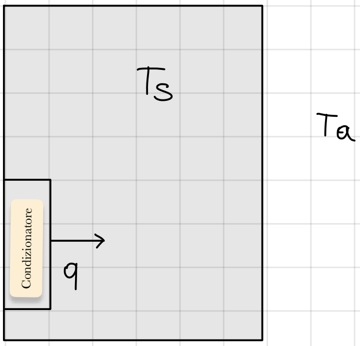
MODELLI TERMICI



$$\boxed{C}\frac{dT}{dt} = q$$

Capacità Termica

Flusso Termico

↳ $q = \frac{dQ}{dt}$

CALORE

$$C = \frac{Q}{\Delta T}$$

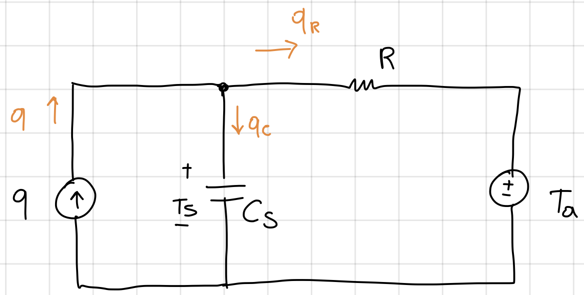
Variazione di Temp.

$$\begin{cases} i \rightarrow q \\ v \rightarrow T \end{cases}$$

Circuiti → Termic.

$$\boxed{R = \frac{\Delta T}{q}}$$

Resistenza Termica → funziona per $\begin{cases} \text{CONDUZIONE} \\ \text{CONVEZIONE} \end{cases}$



$$(1) \quad C_S \frac{dT_s}{dt} = q - q_R \quad \text{con} \quad q_R = \frac{T_S - T_a}{R}$$

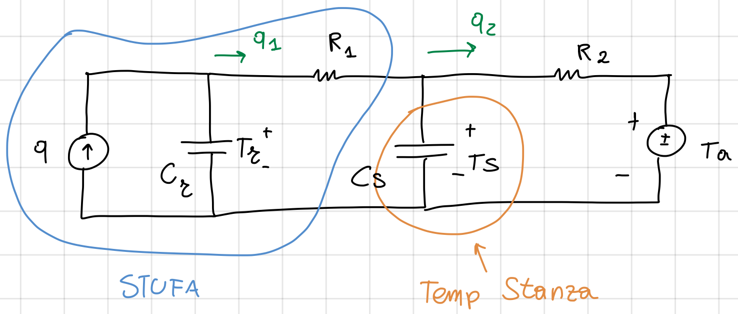
$u_1 = q$ $\qquad$ $u_2 = T_a$ $\qquad$ $x = T_S$

$$G(s) = \frac{T_S(s)}{Q(s)} \Rightarrow \qquad s\,C_S\,T_S = Q - \frac{T_S - T_a}{R} \rightarrow \left(sC_S + \frac{1}{R}\right) T_S = Q + \frac{1}{R} T_a$$

$$\rightarrow \text{mcm} \rightarrow \quad T_S = \boxed{\frac{R}{sRC_S + 1}} Q + \boxed{\frac{1}{sRC_S + 1} T_a}$$

Influenza della Temp. esterna

IL RADIATORE



$$C_r \frac{dT_r}{dt} = q - q_1$$

$$q_1 = \frac{T_r - T_s}{R_1}$$

$$C_s \frac{dT_s}{dt} = q_1 - q_2$$

$$q_2 = \frac{T_s - T_a}{R_2}$$

$u_1 = T_a$ $\quad$ $u_2 = q$

$x_1 = T_r$ $\quad$ $x_2 = T_s$

$s C_r T_r = Q - Q_1$ → Sub Q_1 → $s C_r T_r = Q - \frac{T_r}{R_1} + \frac{T_s}{R_1}$ → Trovo T_r (1)

$s C_s T_s = Q_1 - Q_2$ → Sub Q_2 → $s C_s T_s = \frac{T_r}{R_1} - \frac{T_s}{R_1} + \frac{T_s}{R_2} - \frac{T_a}{R_2}$ (2)

dalla (2) → $\left(s C_s + \frac{1}{R_1} + \frac{1}{R_2}\right) T_s = \frac{T_r}{R_1} + \frac{T_a}{R_2}$

→ $\left(s C_s + \frac{1}{R_1} + \frac{1}{R_2}\right) T_s = \frac{1}{1 + s R_1 C_r} Q + \boxed{\frac{1/R_1}{1 + s R_1 C_r} T_s} + \frac{T_a}{R_2}$