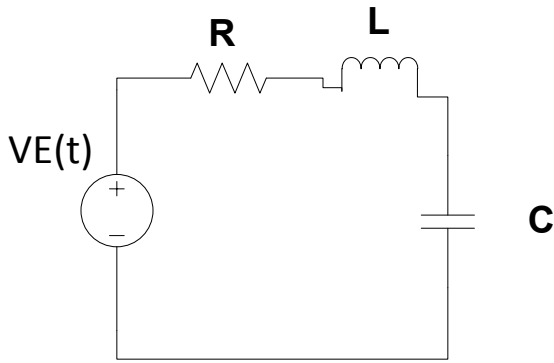


SISTEMA LINEARES INVARIANTES NO TEMPO

CIRCUITO RLC Série



$$i_C(t) = C \cdot \frac{dV_C(t)}{dt}$$

$$V_L(t) = L \cdot \frac{di(t)}{dt}$$

Dominio do tempo

$$\frac{RC \, dV_C(t)}{dt}$$

$$LC \frac{d^2 V_C(t)}{dt^2}$$

$$V_C(t)$$

Dominio de Laplace

$$sRC \cdot V_C(s)$$

$$s^2 LC \cdot V_C(s)$$

$$V_C(s)$$

Dominio do tempo

$$V_r(t) + V_l(t) + V_c(t) = V_e(t)$$

$$R \cdot i(t) + L \cdot \frac{di(t)}{dt} + V_C(t) = V_e(t)$$

$$R \cdot C \cdot \frac{dV_C(t)}{dt} + LC \cdot \frac{d^2 V_C(t)}{dt^2} + V_C(t) = V_e(t)$$

Dominio de Laplace

$$\mathcal{L}^{-1} \left(R \cdot C \cdot \frac{dV_C(t)}{dt} + LC \cdot \frac{d^2 V_C(t)}{dt^2} + V_C(t) \right) = V_e(t)$$

$$V_C(s) \cdot (sRC + s^2 LC + 1) = V_e(s)$$

Teorema do Valor Final:

$$\frac{V_C(s)}{V_e(s)} = \frac{1}{s^2 LC + sRC + 1}$$

$$\frac{V_C(s)}{V_e(s)} = F(s) = \frac{1/LC}{s^2 + sR/L + 1/LC}$$

$$\frac{V_C(s)}{V_e(s)} = \frac{1/LC}{s^2 + sR/L + 1/LC}$$

Teorema do Valor final:

$$V_C(s) = s \cdot F(s) \cdot V_e(s) = s \cdot \frac{1/LC}{s^2 + sR/L + 1/LC} \cdot V_e(s)$$

$$\lim_{s \rightarrow 0} s \cdot \frac{1/LC}{s^2 + sR/L + 1/LC} \cdot V_e(s)$$

Se $V_e(s) = 15 \cdot 1/s$ Degrau, Então $V_e(s) = 15 \cdot 1/s$

$$V_C(s) = s \cdot F(s) \cdot V_e(s) = s \cdot \frac{1/LC}{s^2 + sR/L + 1/LC} \cdot \frac{15}{s}$$

$$\lim_{s \rightarrow 0} \frac{15}{s^2 + sR/L + 1/LC}$$

$$V_C(t \rightarrow \infty) = V_C(s \rightarrow 0) = 15$$