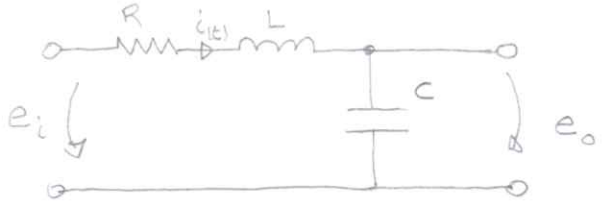
1 a)



$$G(s) = \frac{E_o(s)}{E_i(s)}$$

$$\begin{cases} e_{i(t)} = R \cdot i_{(t)} + L \cdot \frac{d}{dt} i_{(t)} + \frac{1}{C} \cdot \int i_{(t)}\, dt \\ e_{o(t)} = \frac{1}{C} \cdot \int i_{(t)}\, dt \end{cases}$$

$\mathcal{L}$, condições iniciais nulas

$$\begin{cases} E_i(s) = R\, I(s) + L\, s\, I(s) + \frac{1}{C} \cdot \frac{1}{s} I(s) \\ E_o(s) = \frac{1}{C} \cdot \frac{1}{s} I(s) \end{cases}$$

$$\begin{cases} E_i(s) = \left[R + Ls + \frac{1}{sC} \right] I(s) \\ E_o(s) = \frac{1}{sC} \cdot I(s) \iff I(s) = E_o(s) \cdot sC \end{cases}$$

$$E_i(s) = \left[R + Ls + \frac{1}{sC} \right] \cdot E_o(s)\, sC$$

$$\frac{E_o(s)}{E_i(s)} = \frac{1}{sC\left[R + Ls + \frac{1}{sC}\right]} = \frac{1}{RCs + LCs^2 + 1}$$

$$= \frac{1}{LCs^2 + RCs + 1}$$

$$= \frac{\frac{1}{LC}}{s^2 + \frac{R}{L}s + \frac{1}{LC}}$$

$$\begin{cases} I(s) = \dfrac{E_i(s)}{R + Ls + \frac{1}{sC}} \times sC \\ \quad = \dfrac{E_i(s) \times sC}{s^2LC + sRC + 1} \\ E_o = \dfrac{1}{sC} \cdot I(s) \end{cases}$$

$$\frac{R}{L} = 2\xi\omega_n$$

$$\frac{1}{LC} = \omega_n^2$$

$E_i \rightarrow \boxed{\frac{sC}{s^2LC + sRC + 1}} \rightarrow I_s$

$I(s) \rightarrow \boxed{\frac{1}{sC}} \rightarrow E_o$

$\Rightarrow$

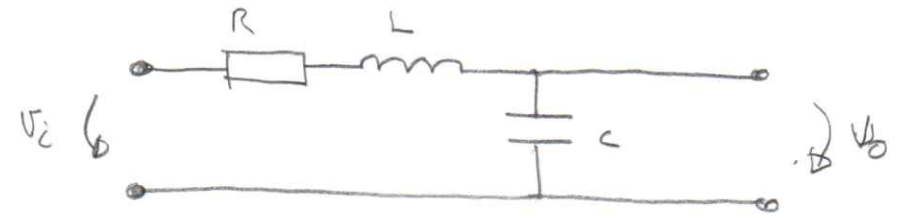
$E_i \rightarrow \boxed{\frac{sC}{s^2LC + sRC + 1}} \rightarrow \boxed{\frac{1}{sC}} \rightarrow E_o$

$E_i \rightarrow \boxed{\frac{1 \times \frac{1}{LC}}{s^2LC + sRC + 1 \times \frac{1}{LC}}} \rightarrow E_o$

M

Modelação de sistemas

1 a)



$$V_{o(t)} = \frac{1}{C}\int_0^{\pi} i(t)\,dt \Leftrightarrow V_{o(s)} = \frac{1}{C}\,\frac{i(s)}{s}$$

frequências

$$V_{o(s)} = \frac{1}{C}\,\frac{i(s)}{s} = \frac{1}{sC}\,i(s)$$

$$V_{i(t)} = R\,i(t) + L\cdot\frac{d}{dt}\,i(t) + \frac{1}{C}\int_0^{\pi} i(t)\,dt.$$

$$V_{i(s)} = R\,i(s) + L\,s\,i(s) + \frac{1}{C}\,\frac{i(s)}{s}$$

conjugação

$$V_{i(s)} = R\,V_{o(s)}\,C\,s + L\,s\,V_{o(s)}\,C\,s + \frac{1}{\not{C}}\,\frac{V_{o(s)}\not{C}\not{s}}{\not{s}}$$

$$V_{i(s)} = (RCs + Ls^2C + 1)\,V_{o(s)}$$

$$\frac{V_{o(s)}}{V_{i(s)}} = \frac{1}{s^2LC + RCs + 1}$$

$$= G\cdot\frac{\frac{1}{LC}}{s^2 + \left(\frac{R}{L}\right)s + \left(\frac{1}{LC}\right)}$$

$\left(\frac{1}{LC}\right) \rightarrow \omega_n^2$

$\left(\frac{R}{L}\right) \rightarrow 2\xi\omega_n$

$i(s)\left(R + Ls + \frac{1}{sC}\right) = V_{(s)i}$

$i(s)\left(\frac{1}{sC}\right) = V_{o(s)}$

$G = 1.$

1 a)

$$\frac{\frac{1}{sC}}{R + Ls + \frac{1}{Cs}} = \frac{1}{RsC + s^2LC + 1}$$

$$= \frac{\div \frac{1}{LC}}{\div \frac{1}{LC}} \quad \frac{\frac{1}{LC}}{s^2 + \frac{R}{L}s + \frac{1}{LC}} \cdot G$$

$$\omega_c^2$$

$$2\xi\omega_n$$

$$G = \underline{1}.$$

1a)

$$\begin{cases} E_{i(s)} = \left[R + LS + \frac{1}{SC}\right] I_{(s)} \\ E_{o(s)} = \frac{1}{SC} \quad I_{(s)} \end{cases}$$

$$\begin{pmatrix} E_{i(s)} \\ E_{o(s)} \end{pmatrix} = \begin{bmatrix} R + LS + \frac{1}{SC} \\ \frac{1}{SC} \end{bmatrix} I_{(s)} = \frac{\frac{1}{SC}}{R + LS + \frac{1}{SC}}$$

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