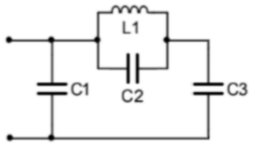
Eje 3

lunes, 26 de septiembre de 2022 19:49

Ejercicio #3

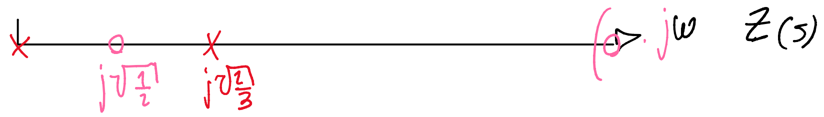
Dada la función de Excitación $Z_{(s)}$ se pide hallar los valores de los componentes sabiendo que $L_1 C_2 = 1/\pi$

$$Z_{(s)} = \frac{2s^2+1}{s\,(3s^2+2)}$$



¿ Desde el punto de vista de transmisión: tiene polo, cero o un nivel constante en corriente continua ?

$$Z_{(s)} = \frac{2.(s^2+1/2)}{3s.(s^2+2/3)}$$



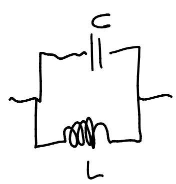
$$Si: \; L_1 . C_1 = \frac{1}{\pi}$$

$$\text{Tanque } L, C \rightarrow = \frac{2k_i s}{s^2 + w_i^2}$$

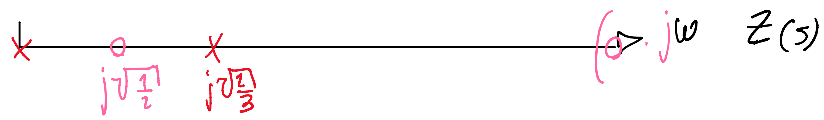
$$Z = \frac{1}{s.\underbrace{\frac{1}{2k_i}}_{C} + \frac{1}{s}.\underbrace{\frac{w_i^2}{2k_i}}_{L}}$$

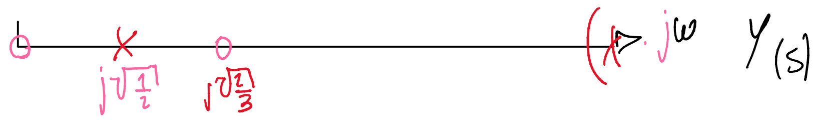
$$L.C = \frac{1}{\cancel{2k_i}} . \frac{\cancel{2k_i}}{w_i^2} = \frac{1}{\pi}$$

$$\text{En } (w_i)^2 = \pi$$



→ Resuena (circuito Abierto)





Remoción Parcial para que quede

Parcial para que quede en $\sqrt{\pi}$

Remoción Parcial:

$$Y_{(s)} - s.K'_\infty = Y_2(s)\Big|_{s^2=-\pi} = 0$$

$$K'_\infty = \frac{3\cancel{s}(s^2+2/3)}{2.(s^2+1/2)} \cdot \frac{1}{\cancel{s}}\Bigg|_{s^2=-\pi} = \frac{-3\pi+2}{-2\pi+1}$$

$$Y_2(s) = \frac{3s^3+s.2}{2.(s^2+1/2)} - \overset{A}{\frac{(2-3\pi)}{(1-2\pi)}}.s$$

$$Y_{2(s)} = \frac{3s^3+2s - s.A.2(s^2+1/2)}{2(s^2+1/2)}$$

$$Y_2(s) = \frac{3s^3+2s - s^3.2A - sA}{2(s^2+1/2)}$$

$$= \frac{s^3(3-2A)+s.(2-A)}{2(s^2+1/2)}$$

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In [3]: A = (2-3*np.pi)/(1-2*np.pi)

In [4]: A
Out[4]: 1.4053601244460374

In [5]: num = [3-2*A,0,2-A,0]

In [6]: roots(num)
Traceback (most recent call last):

  File "/tmp/ipykernel_10268/2335930442.py", line 1, in <cell line: 1>
    roots(num)

NameError: name 'roots' is not defined


In [7]: np.roots(num)
Out[7]: array([-0.+1.77245385j, 0.-1.77245385j, 0.+0.j        ])
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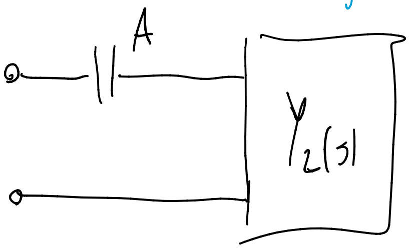
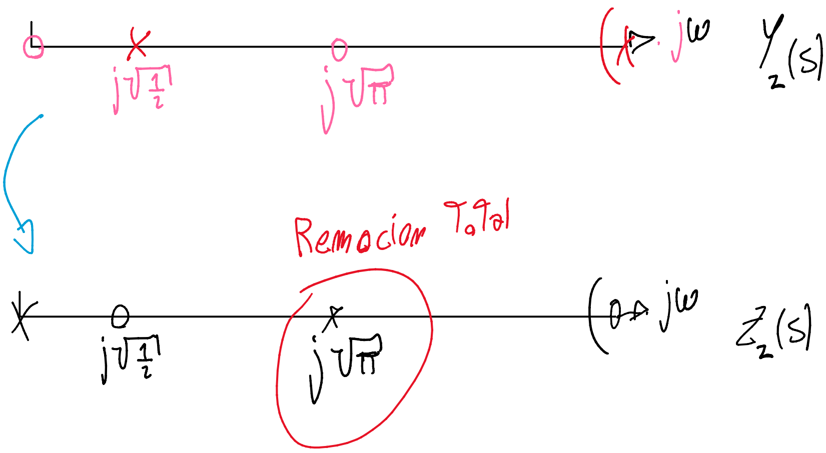
$j\sqrt{\pi}$

$$Y_{2(s)} = \frac{(3-2A)\cdot(s^2+\pi)\,s}{2\,(s^2+1/2)}$$





$$Z_2 - \frac{2K_3 s}{s^2+\pi}$$

$$2K_3 = \lim_{s^2\to -\pi} Z_2(s)\cdot\frac{(s^2+\pi)}{s}$$

$$K_3 = \lim_{s^2\to-\pi} \frac{1}{\cancel{2}}\,\frac{\cancel{2}(s^2+1/2)}{(3-2A)\cancel{(s^2+\pi)}\,s}\cdot\frac{\cancel{(s^2+\pi)}}{s} = 4{,}44$$

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In [8]: s_2 = -1*np.pi

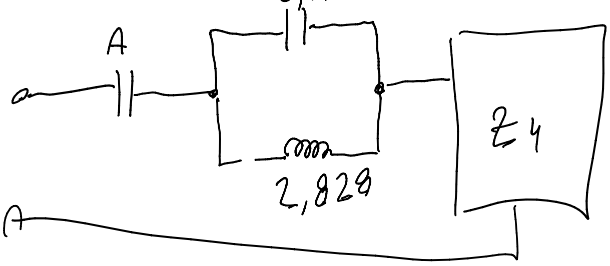
In [9]: k3 = (s_2 + (1/2))/((3-2*A)*s_2)

In [10]: k3
Out[10]: 4.442340250271484
```

$$Z_3 = \frac{2K_3 s}{s^2+\pi} = \frac{1}{s\cdot\frac{1}{2K_3} + \frac{1}{s}\frac{\pi}{2K_3}}$$

$1/L$

C



$$Z_4 = Z_2 - Z_3 = \frac{2\left(s^2+\frac{1}{2}\right)}{(3-2A)(s^2+\pi)s} - \frac{2k_3 s}{(s^2+\pi)}$$

$$Z_4 = \frac{2s^2+1-2k_3 s^2 \cdot (3-2A)}{(3-2A)(s^2+\pi)s} = \frac{s^2\cdot\overbrace{\left(2-2k_3(3-2A)\right)}^{B=0{,}318}+1}{(3-2A)(s^2+\pi)s}$$

$$Z_4 = \frac{B.\left(s^2+\frac{1}{B}\right)}{(3-2A)(s^2+\pi)s} = \frac{B\cdot\cancel{(s^2+\pi)}}{(3-2A)\cancel{(s^2+\pi)}s} = \underbrace{\frac{1}{s}\cdot\frac{B}{(3-2A)}}_{Z_c \Rightarrow \; 0{,}5946}$$

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In [13]: B = 2-2*k3*(3-2*A)

In [14]: B
Out[14]: 0.31830988618379097

In [15]: np.roots([1,0,1/B])
Out[15]: array([-0.+1.77245385j,  0.-1.77245385j])

In [16]: np.sqrt(np.pi)
Out[16]: 1.7724538509055159
```