Tarea Semanal #7

Guía de TP#5, Ejercicio #2

Pasa Bajos Butter orden 2:

$$T(s) = \frac{\omega_c^2}{s^2 + s\frac{\omega_c}{Q} + \omega_c^2} = \frac{\omega_c^2}{s^2 + \sqrt{2}\,\omega_c s + \omega_c^2}$$

* Butter orden 2

$$T(z) = T(s)\Big|_{s = k\cdot\frac{z-1}{z+1}} = \frac{\omega_c^2}{k^2\left(\frac{z-1}{z+1}\right)^2 + \sqrt{2}\,\omega_c k\left(\frac{z-1}{z+1}\right) + \omega_c^2} = \frac{\omega_c^2\cdot(z+1)^2}{k^2(z-1)^2 + \sqrt{2}\,\omega_c\cdot(z-1)(z+1) + \omega_c^2(z+1)^2}$$

$$T(z) = \frac{\omega_c^2\cdot(z+1)^2}{k^2\cdot(z^2-2z+1) + \sqrt{2}\,\omega_c(z^2-1) + \omega_c^2\cdot(z^2+2z+1)}$$

Normalizando

$$T(z) = \frac{\omega_c^2\cdot(z+1)^2}{z^2\cdot(k^2+\sqrt{2}\,\omega_c+\omega_c^2) + z\cdot(2\omega_c^2 - 2k^2) + (k^2 - \sqrt{2}\,\omega_c + \omega_c^2)}$$

$K = 2 \Rightarrow f_s = \frac{1}{2\pi} \Rightarrow f_c = \frac{0{,}01}{2\pi}$

$$T(z) = \frac{100\times10^{-6}\,(z+1)^2}{(4{,}014)\,z^2 - z\cdot(7{,}9998) + 3{,}9859} \simeq \frac{25{,}911\times10^{-6}\,(z+1)^2}{z^2 - 2z + 1}$$