ORIGIN := 1

$C := (0.990732 \quad 0.55772 \quad 0.124707)^T$ $K := 2$ $\omega o := 2\cdot\pi\cdot 100 = 628.319$ **частота среза**

неравномерность в децебелах ε=1

$B := (0.124362 \quad 0.339763 \quad 0.464125)^T$

$\omega 1 := 750$

$$W1(p) := \frac{K\cdot C_1\cdot \omega o^2}{p^2 + B_1\cdot p\cdot \omega o + C_1\cdot \omega o^2} \qquad W2(p) := \frac{K\cdot C_2\cdot \omega o^2}{p^2 + B_2\cdot p\cdot \omega o + C_2\cdot \omega o^2}$$

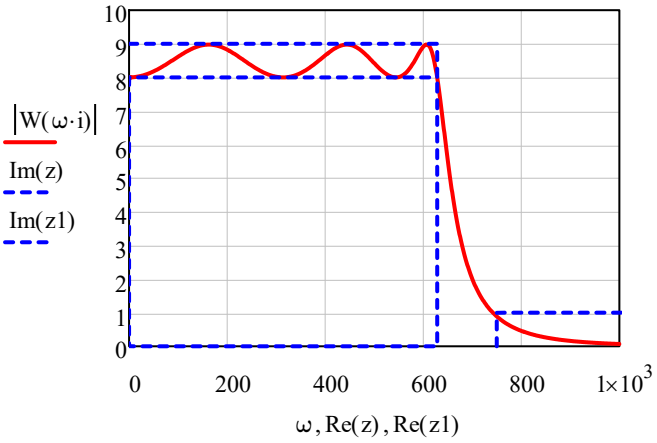
$$W3(p) := \frac{K\cdot C_3\cdot \omega o^2}{p^2 + B_3\cdot p\cdot \omega o + C_3\cdot \omega o^2}$$

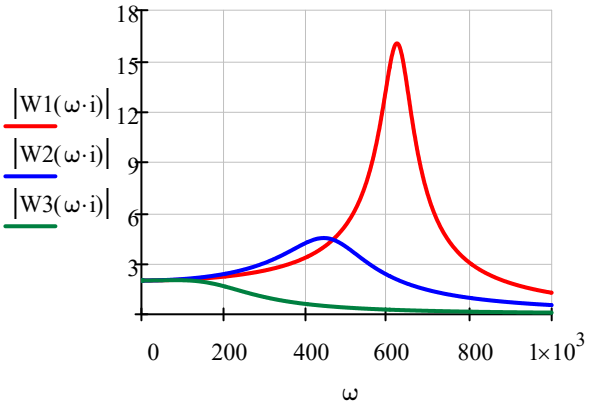
$z := (9i \quad 9i + \omega o \quad 8i + \omega o \quad 8i \quad 0 \quad \omega o \quad 8i + \omega o)^T$

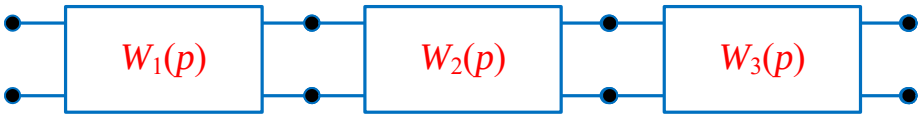
$z1 := (\omega 1 \quad \omega 1 + j \quad i + \omega o\cdot 10)^T$

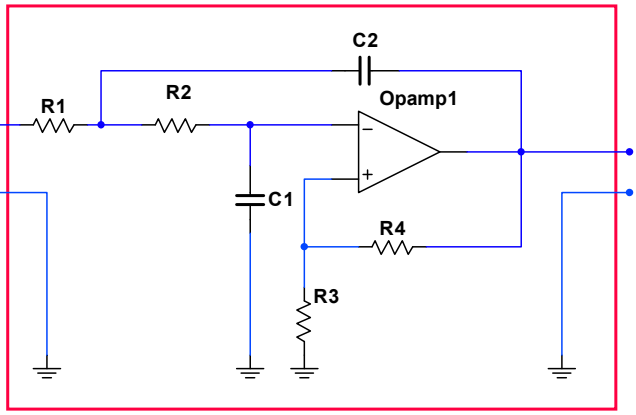
$\omega o = 628.319$

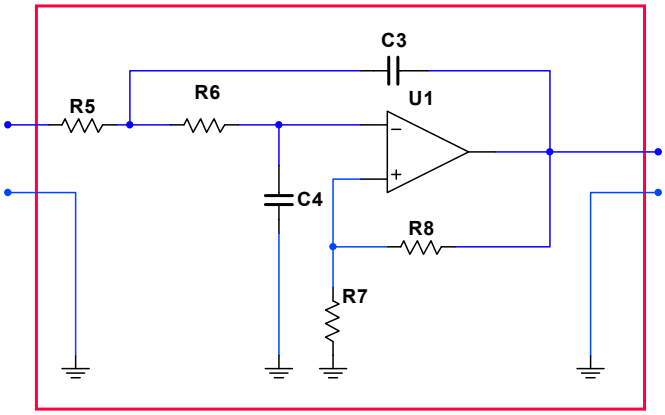
$W(p) := W1(p)\cdot W2(p)\cdot W3(p)$ $\omega := 0, 1 .. 10^3$

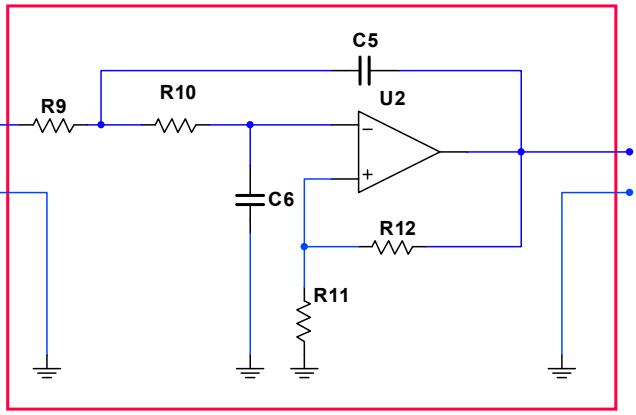












Расчет первого звена

$C_2 := 0.1 \cdot 10^{-6}$ $\quad C := C_1$ $\quad B := B_1$

$$C_1 := \frac{\left[B^2 + 4 \cdot C \cdot (K - 1)\right] \cdot C_2}{4 \cdot C} \qquad C_1 = 1.004 \times 10^{-7}$$

Начинаем расчет с радикала (корень квадратный)

$$R_1 := \frac{2}{\left[B \cdot C_1 + \sqrt{\left[B^2 + 4 \cdot C \cdot (K - 1)\right] \cdot {C_2}^2 - 4 \cdot C \cdot C_1 \cdot C_2}\right] \cdot \omega o} \qquad R_1 = 2.54959 \times 10^5$$

$$R_2 := \frac{1}{{\omega o}^2 \cdot C \cdot C_1 \cdot C_2 \cdot R_1} \qquad R_2 = 998.899$$

$$R_3 := \frac{K \cdot (R_1 + R_2)}{K - 1} \qquad R_3 = 5.119 \times 10^5$$

$$R_4 := K \cdot (R_1 + R_2) \qquad R_4 = 5.119 \times 10^5$$

$$H1(p) := \frac{K \cdot C_0 \cdot {\omega o}^2}{p^2 + B_0 \cdot p \cdot \omega o + C_0 \cdot {\omega o}^2} \qquad K := 1 + \frac{R_3}{R_4} \qquad C \cdot {\omega o}^2 = 3.911 \times 10^5$$

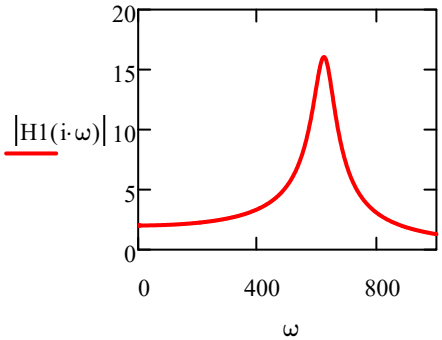
$$K = 2 \qquad \frac{1}{R_1 \cdot R_2 \cdot C_1 \cdot C_2} = 3.911 \times 10^5$$

$$B \cdot \omega o = 78.139$$

$$\frac{1}{C_2} \cdot \left(\frac{1}{R_2} + \frac{1}{R_1}\right) - \frac{1}{R_2 \cdot C_1} \cdot \left(\frac{R_3}{R_4}\right) = 78.14$$

$$H1(p) := \frac{\left(1 + \frac{R_3}{R_4}\right) \cdot \frac{1}{R_1 \cdot R_2 \cdot C_1 \cdot C_2}}{p^2 + \left[\frac{1}{C_2} \cdot \left(\frac{1}{R_2} + \frac{1}{R_1}\right) - \frac{1}{R_2 \cdot C_1} \cdot \left(\frac{R_3}{R_4}\right)\right] \cdot p + \frac{1}{R_1 \cdot R_2 \cdot C_1 \cdot C_2}}$$

$\omega := 0, 1 .. 10^3$



Расчет второго звена

$C_2 := 0.1 \cdot 10^{-6}$ $\quad C := C_2$ $\quad B := B_2$

$$C_1 := \frac{\left[B^2 + 4\cdot C\cdot(K-1)\right]\cdot C_2}{4\cdot C} \qquad C_1 = 1.052\times 10^{-7}$$

$$R_1 := \frac{2}{\left[B\cdot C_1 + \sqrt{\left[B^2 + 4\cdot C\cdot(K-1)\right]\cdot {C_2}^2 - 4\cdot C\cdot C_1\cdot C_2}\right]\cdot \omega o} \qquad R_1 = 89076.51478$$

$$R_2 := \frac{1}{{\omega o}^2\cdot C\cdot C_1\cdot C_2\cdot R_1} \qquad R_2 = 4.848\times 10^3$$

$$R_3 := \frac{K\cdot(R_1 + R_2)}{K-1} \qquad R_3 = 1.878\times 10^5$$

$$R_4 := K\cdot(R_1 + R_2) \qquad R_4 = 1.878\times 10^5$$

$$H2(p) := \frac{K\cdot C\cdot {\omega o}^2}{p^2 + B\cdot p\cdot \omega o + C\cdot {\omega o}^2} \qquad K := 1 + \frac{R_3}{R_4} \qquad C\cdot {\omega o}^2 = 2.202\times 10^5$$

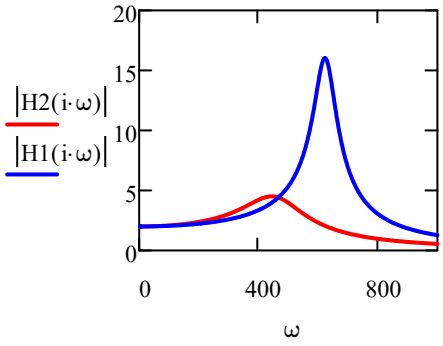
$$K = 2 \qquad \frac{1}{R_1\cdot R_2\cdot C_1\cdot C_2} = 2.202\times 10^5$$

$$B\cdot \omega o = 213.479$$

$$\frac{1}{C_2}\cdot\left(\frac{1}{R_2} + \frac{1}{R_1}\right) - \frac{1}{R_2\cdot C_1}\cdot\left(\frac{R_3}{R_4}\right) = 213.751$$

$$H2(p) := \frac{\left(1 + \frac{R_3}{R_4}\right)\cdot\frac{1}{R_1\cdot R_2\cdot C_1\cdot C_2}}{p^2 + \left[\frac{1}{C_2}\cdot\left(\frac{1}{R_2} + \frac{1}{R_1}\right) - \frac{1}{R_2\cdot C_1}\cdot\left(\frac{R_3}{R_4}\right)\right]\cdot p + \frac{1}{R_1\cdot R_2\cdot C_1\cdot C_2}}$$

$$\omega := 0, 1 .. 10^3$$



Расчет третьего звена

$$C_2 := 0.1\cdot 10^{-6} \qquad C := C_3 \qquad B := B_3$$

$$C_1 := \frac{\left[B^2 + 4\cdot C\cdot(K-1)\right]\cdot C_2}{4\cdot C} \qquad C_1 = 1.432\times 10^{-7}$$

$$R_1 := \frac{2}{\left[B\cdot C_1 + \sqrt{\left[B^2 + 4\cdot C\cdot(K-1)\right]\cdot {C_2}^2 - 4\cdot C\cdot C_1\cdot C_2}\right]\cdot \omega o} \qquad R_1 = 47898.48863$$

$$R_2 := \frac{1}{{\omega o}^2\cdot C\cdot C_1\cdot C_2\cdot R_1} \qquad R_2 = 2.962\times 10^4$$

$$R_3 := \frac{K\cdot(R_1 + R_2)}{K - 1} \qquad R_3 = 1.55 \times 10^5$$

$$R_4 := K\cdot(R_1 + R_2) \qquad R_4 = 1.55 \times 10^5$$

$$H3(p) := \frac{K\cdot C\cdot \omega o^2}{p^2 + B\cdot p\cdot \omega o + C\cdot \omega o^2} \qquad K := 1 + \frac{R_3}{R_4} \qquad C\cdot \omega o^2 = 4.923 \times 10^4$$

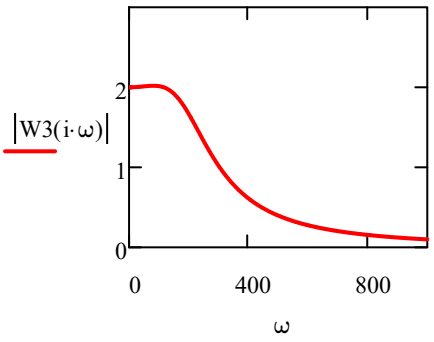
$$K = 2 \qquad \frac{1}{R_1\cdot R_2\cdot C_1\cdot C_2} = 4.923 \times 10^4$$

$$B\cdot \omega o = 291.618$$

$$\frac{1}{C_2}\cdot\left(\frac{1}{R_2} + \frac{1}{R_1}\right) - \frac{1}{R_2\cdot C_1}\cdot\left(\frac{R_3}{R_4}\right) = 310.609$$

$$H3(p) := \frac{\left(1 + \frac{R_3}{R_4}\right)\cdot\frac{1}{R_1\cdot R_2\cdot C_1\cdot C_2}}{p^2 + \left[\frac{1}{C_2}\cdot\left(\frac{1}{R_2} + \frac{1}{R_1}\right) - \frac{1}{R_2\cdot C_1}\cdot\left(\frac{R_3}{R_4}\right)\right]\cdot p + \frac{1}{R_1\cdot R_2\cdot C_1\cdot C_2}}$$

$$\omega := 0, 1 .. 10^3$$



$$A(\omega) := H1(\omega)\cdot H2(\omega)\cdot H3(\omega)$$