a -

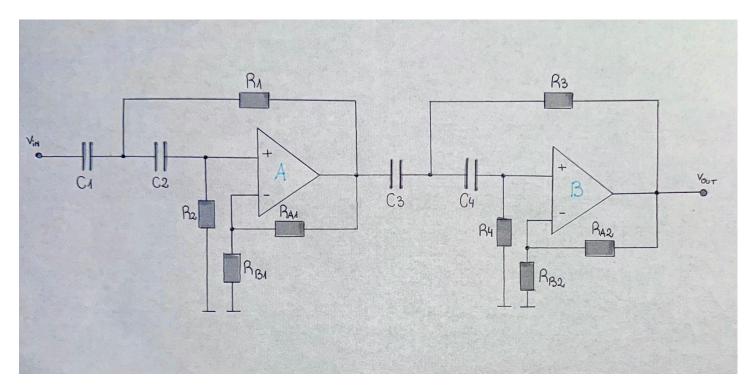


Figura 1. Schema electrica a filtrului

ORDER	SECTION	REAL PART	PART	Fo	d	Q	PEAK. FREQ.	PEAK. LEVEL
4	1	0,3199	0,3888	0,5019	1,2746	0,7845	0,2174	0,1557
	2	0.1325	0,9339	0,9433	0,2809	3, 5594	0,9245	11,1142,

Figura 2. TSCHEBYSCHEFF COEFFICIENTS FOR 1 dB passband ripple

1. CALCULE:

ETAJUL A:

Comsiderăm
$$\begin{cases} C_1 = C_2 = C \\ R_1 = R_2 = R \end{cases}$$
 $W_{O1} = 2\pi f_1 = 2\pi \cdot 0.5013 \cdot 3.1k = 3.74k$
 $W_{O2} = \frac{1}{\sqrt{R_1 R_2 C_1 C_2}} = \frac{1}{RC}$

Alegerm orbitror $C = I_{Om}F$

$$\Rightarrow R = \frac{1}{3.74 \cdot 10^3 \cdot 10 \cdot 10^9} = \frac{1}{9.74 \cdot 10^5} = 0.10235 \cdot 10^5 = 10.235 \cdot 10^3 \Rightarrow R = R_4 \cdot R_2 = 10 k \Omega$$
 $C = C_4 = C_2 = I_{Om}F$

$$C = \frac{1}{3 \cdot H_0}$$

$$H_0 = 1 + \frac{R_{MM}}{R_{BM}}$$

$$\Rightarrow 0.7345 \left(2 - \frac{R_M}{R_{BM}}\right) = A \Rightarrow 2 - \frac{R_{MM}}{R_{BM}} = \frac{1}{0.7345} \Rightarrow 2 - \frac{R_{MM}}{R_{BM}} = 1.274163 \Rightarrow - \frac{R_{MM}}{R_{BM}} = 1.274163 - 2 \Rightarrow - \frac{R_{MM}}{R_{BM}} = -0.725 \Rightarrow \frac{R_{MM}}{R_{BM}} = 0.725 \cdot 5.1k = 3.69k$$

$$R_{MM} = 3.63 k \Omega \approx 3.3 k \Omega$$

$$R_{MM} = 3.98 k \Omega$$

$$R_{MM} = 5.1 k k \Omega$$

Figura 4. Dimensionare etaj A

ETAJUL B:

Comsiderăm:
$$\begin{cases} C_3 = C_4 = C \\ R_3 = R_4 = R \end{cases}$$
 $W_{02} = 2\pi i \int_{2} = 2\pi i \cdot 0.9433 \cdot 3.4K = 18.364K \}$
 $W_{02} = \frac{1}{\sqrt{R_3 R_4 C_3 C_4}} = \frac{1}{RC}$
 $W_{02} = \frac{1}{\sqrt{R_3 R_4 C_3 C_4}} = \frac{1}{RC}$
 $\Rightarrow \frac{1}{R \cdot 10.10^3} = 18.36 \cdot 10^3 \Rightarrow R = \frac{1}{18.36 \cdot 10^3 \cdot 10.10^3} \Rightarrow R = \frac{1}{18.36 \cdot 10^5} \Rightarrow R = \frac{1}{18.36 \cdot 10^5} \Rightarrow R = \frac{1}{18.36 \cdot 10^5} \Rightarrow R = 0.0544 \cdot 10^5 \Rightarrow R = 5.44 \cdot 10^3 \Rightarrow R = 8.4 \cdot 100 \cdot 100$

Figura 5. Dimensionare etaj B

Figura 6. Determinare functie de transfer

2. SIMULARE LTSPICE:

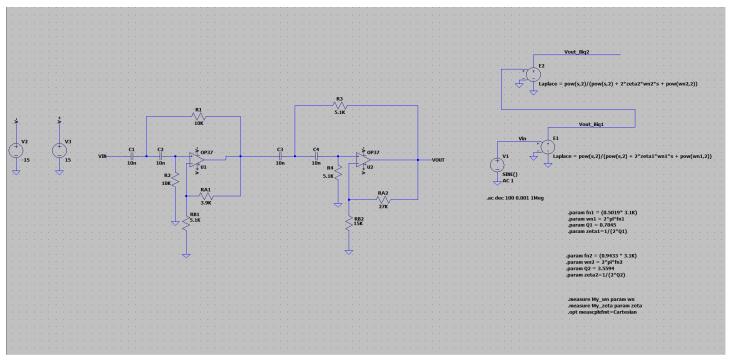


Figura 7. Schema electrica a circuitului + BIQUAZI Laplace

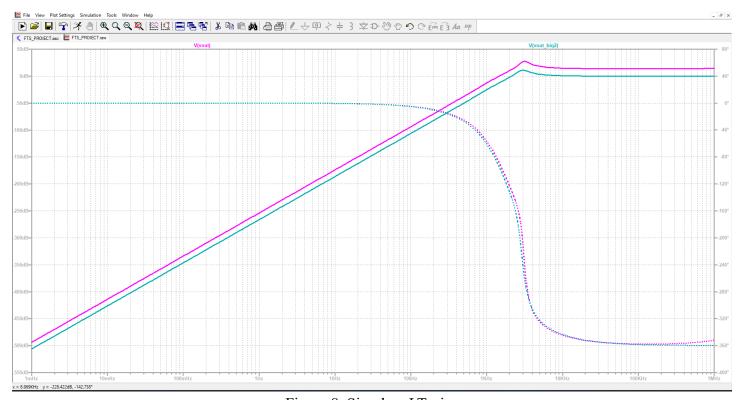


Figura 8. Simulare LTspice

In Figura 8 se observa doua semnale: cu roz este reprezentat iesirea filtrului trece sus realizat de mine, iar cu verde este reprezentata iesirea din biquazii Laplace. Cele doua aproape se suprapun ceea de dovedeste functionalitatea circuitului.

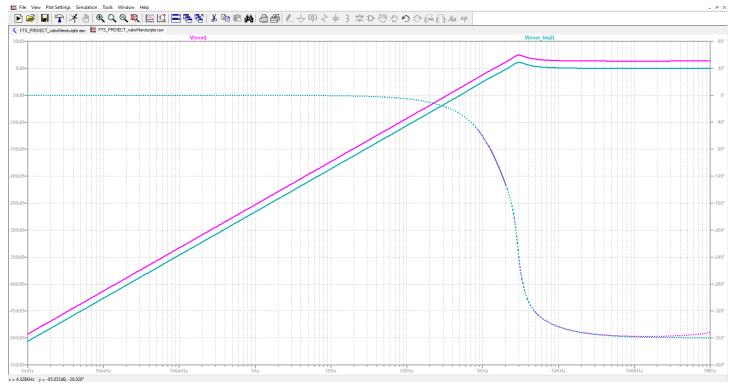


Figura 9. Simulare LTspice

In *Figura 9* este simularea aceluiasi circuit insa rulata cu valorile rezistentelor nerotunjite la valori existente pentru a observa cu adevarat precizia filtrului.

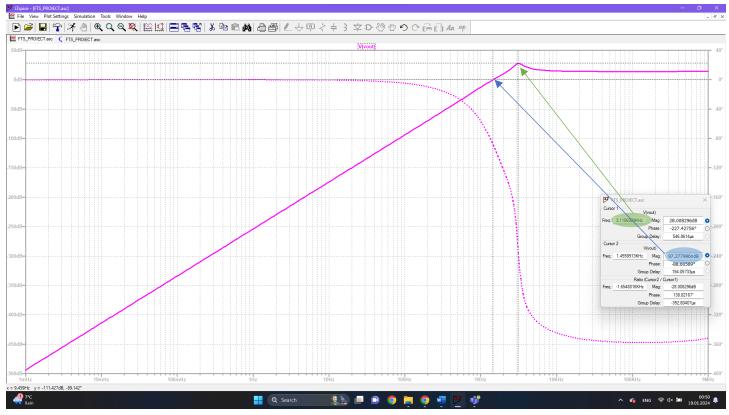


Figura 10. Caracteristica de transfer la 0dB

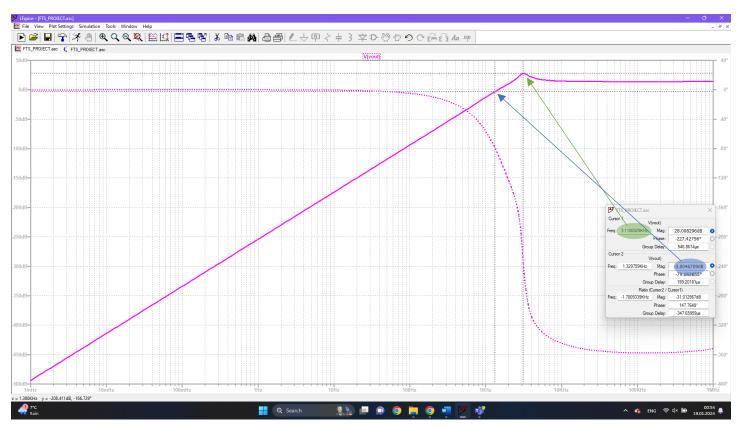
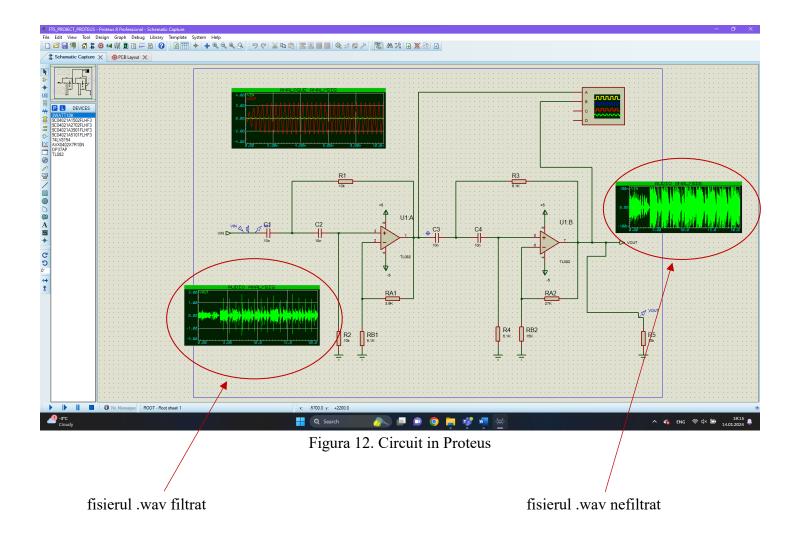


Figura 11. Caracteristica de transfer la -3dB

3. PROTEUS:



4. SCOPY:

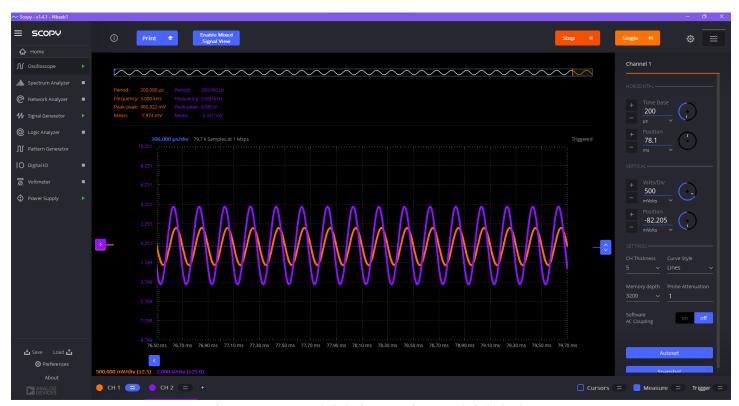


Figura 13. Semnalul de intrare si semnalul de iesire



Figura 14. Caracteristica de transfer a filtrului folosind Network Analyzer, cursorul actual este pozitionat in zona frecventei de taiere



Figura 15. Caracteristica de transfer la 0dB

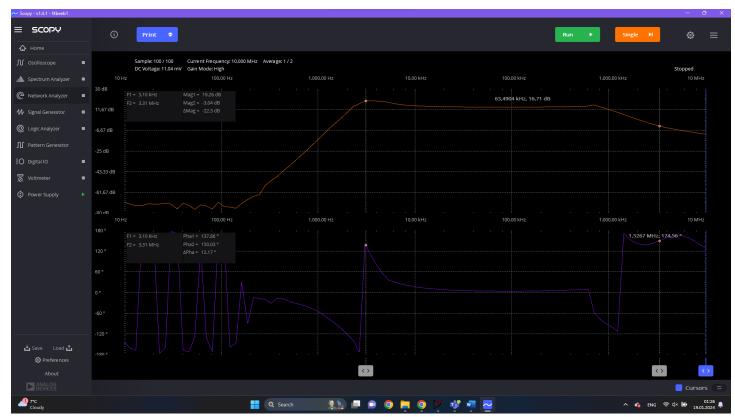


Figura 16. Caracteristica de transfer la -3dB

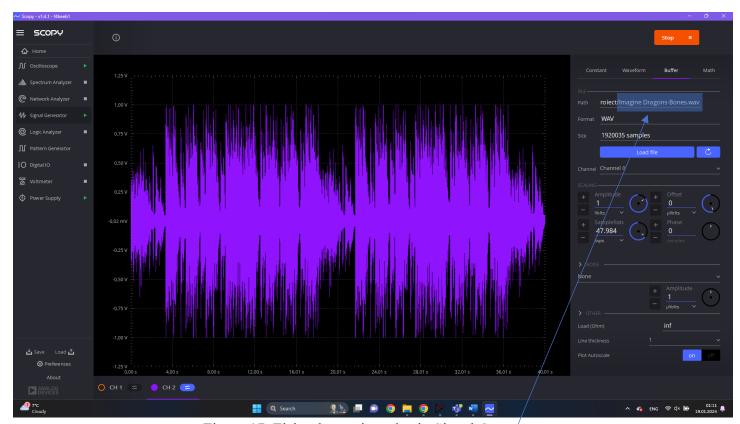


Figura 17. Fisierul .wav introdus in Signal Generator

Fisier numit: Imagine Dragons-Bones.wav