

# Anexos

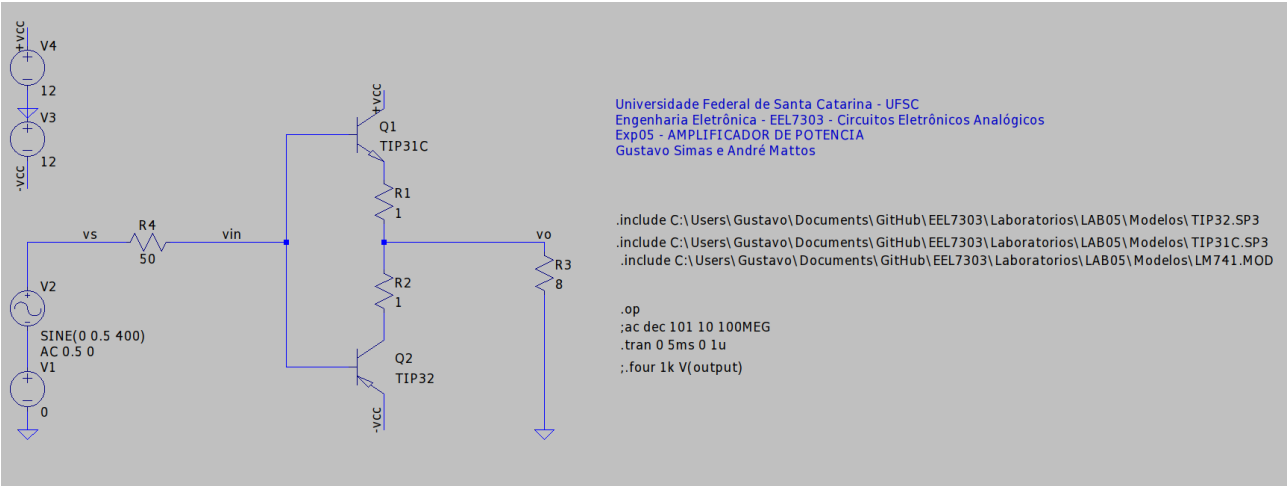


Figura 1 - Amplificador em malha aberta simulado.

--- Operating Point ---		
V(n003):	0	voltage
V(vs):	0	voltage
V(+vcc):	12	voltage
V(vin):	5.49649e-007	voltage
V(n001):	1.08418e-008	voltage
V(vo):	8.64171e-009	voltage
V(n002):	7.52187e-009	voltage
V(-vcc):	-12	voltage
Ic(Q2):	1.11984e-009	device_current
Ib(Q2):	1.95854e-011	device_current
Ie(Q2):	-1.13953e-009	device_current
Ic(Q1):	1.32127e-008	device_current
Ib(Q1):	-1.10126e-008	device_current
Ie(Q1):	-2.20005e-009	device_current
I(R4):	1.0993e-008	device_current
I(R3):	1.08021e-009	device_current
I(R2):	1.11984e-009	device_current
I(R1):	2.20005e-009	device_current
I(V4):	-1.32127e-008	device_current
I(V3):	-1.13948e-009	device_current
I(V2):	1.0993e-008	device_current
I(V1):	1.0993e-008	device_current

Figura 2 - Ponto quiescente do circuito.

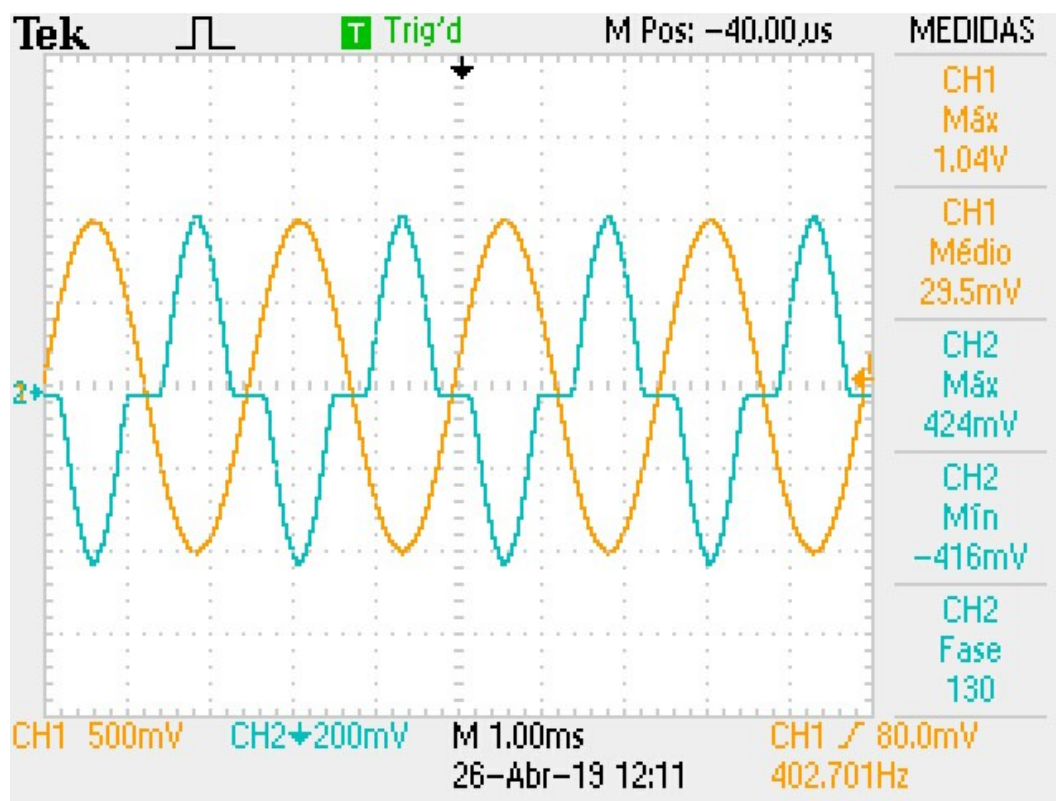


Figura 3 - Formas de onda de entrada (CH1) e saída (CH2).

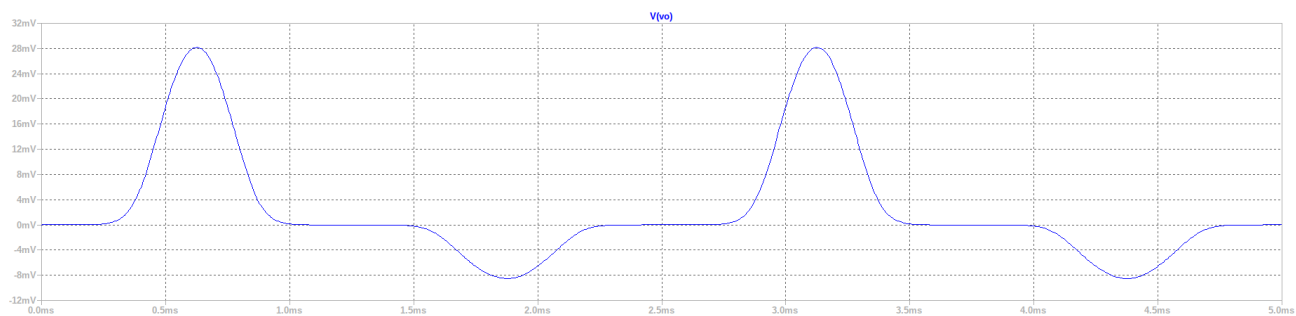


Figura 4 - Forma de onda da saída com  $R_L=8$ .

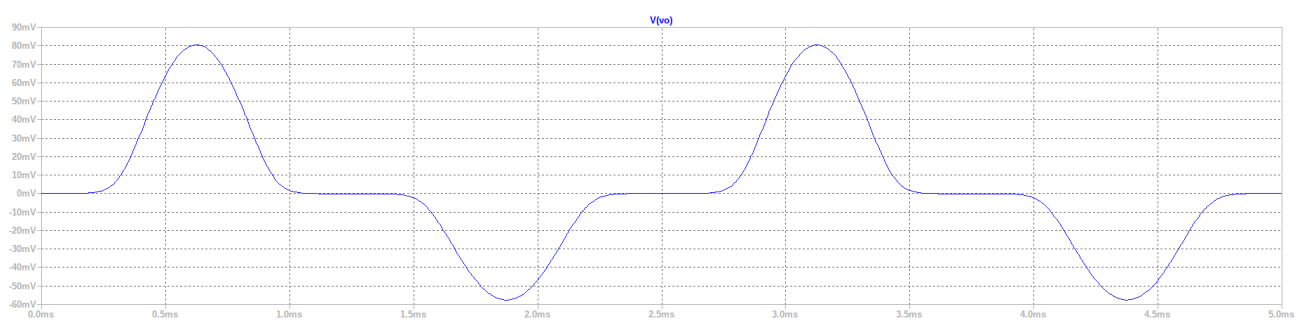


Figura 5 - Forma de onda da saída com  $R_L=100$ .

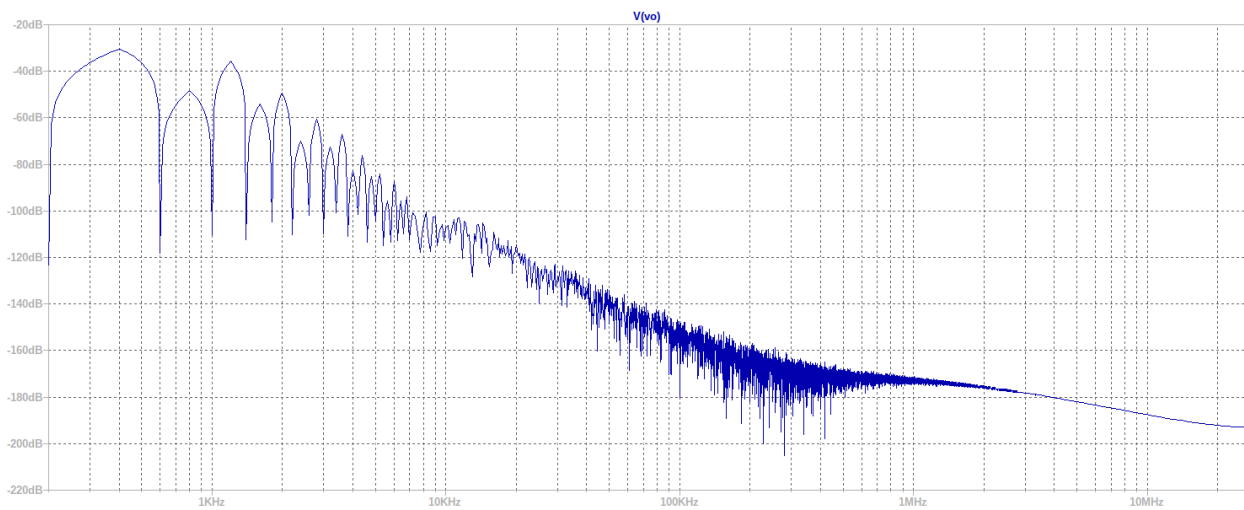


Figura 6 - Espectro de frequência de saída simulada(FFT).

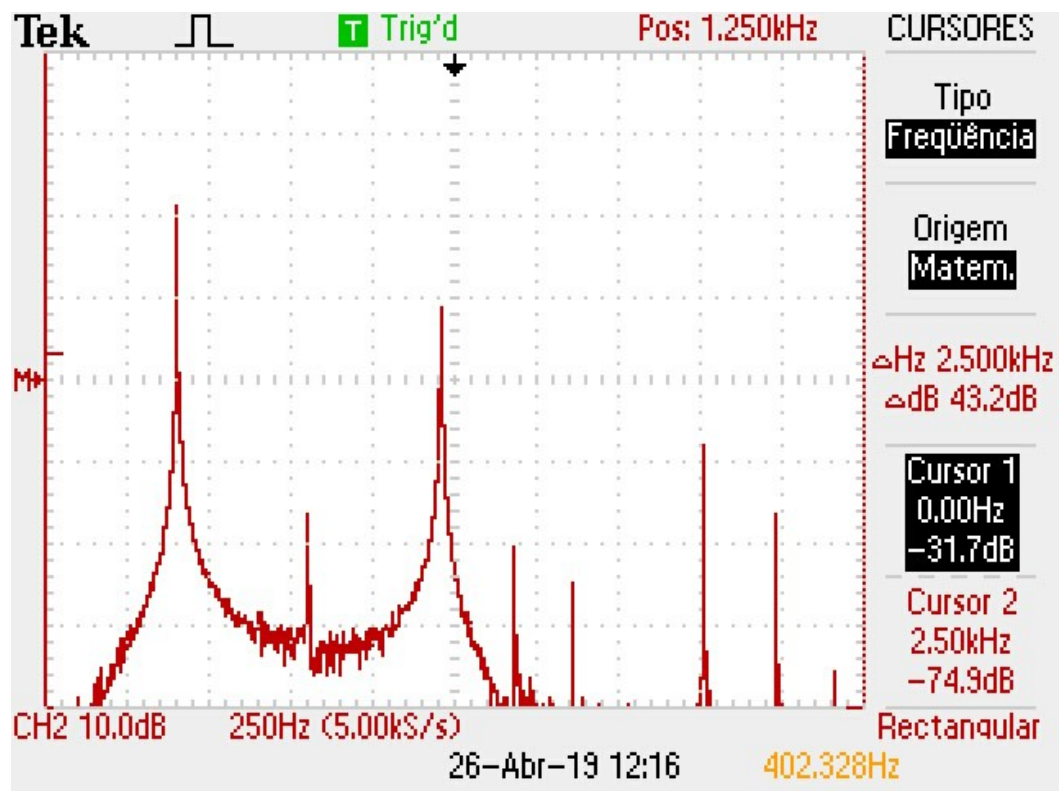


Figura 7 - Espectro de frequência de saída experimental(FFT).

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Circuit: * C:\users\andre\Desktop\Lab05.asc
Direct Newton iteration for .op point succeeded.
N-Period=1
Fourier components of V(vo)
DC component:-0.0245757

Harmonic Number   Frequency [Hz]   Fourier Component   Normalized Phase Component [degree]   Normalized Phase [deg]
1   1.000e+03       3.028e-02          1.000e+00          135.01°          0.00°
2   2.000e+03       4.058e-03          1.340e-01          1.93°-133.08°
3   3.000e+03       1.504e-03          4.966e-02          51.65°          -83.36°
4   4.000e+03       2.033e-04          6.714e-03          120.45°          -14.55°
5   5.000e+03       4.350e-05          1.437e-03          164.32°          29.32°
6   6.000e+03       7.241e-05          2.391e-03          115.42°          -19.59°
7   7.000e+03       1.031e-04          3.406e-03          144.44°          9.44°
8   8.000e+03       7.465e-05          2.465e-03          168.05°          33.04°
9   9.000e+03       1.083e-04          3.576e-03          158.22°          23.21°
Total Harmonic Distortion: 14.320080%(14.344299%)

Date: Fri May 03 05:52:26 2019
Total elapsed time: 0.112 seconds.

tnom = 27
temp = 27
method = modified trap
totiter = 10060
traniter = 10056
tranpoints = 5024
accept = 5023
rejected = 1
matrix size = 18
fillins = 8
solver = Normal
Matrix Compiler1: 1.36 KB object code size 0.8/0.5/[0.5]
Matrix Compiler2: 1.48 KB object code size 0.5/0.6/[0.5]

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Figura 8 - Distorção Harmônica Total (THD) simulada.

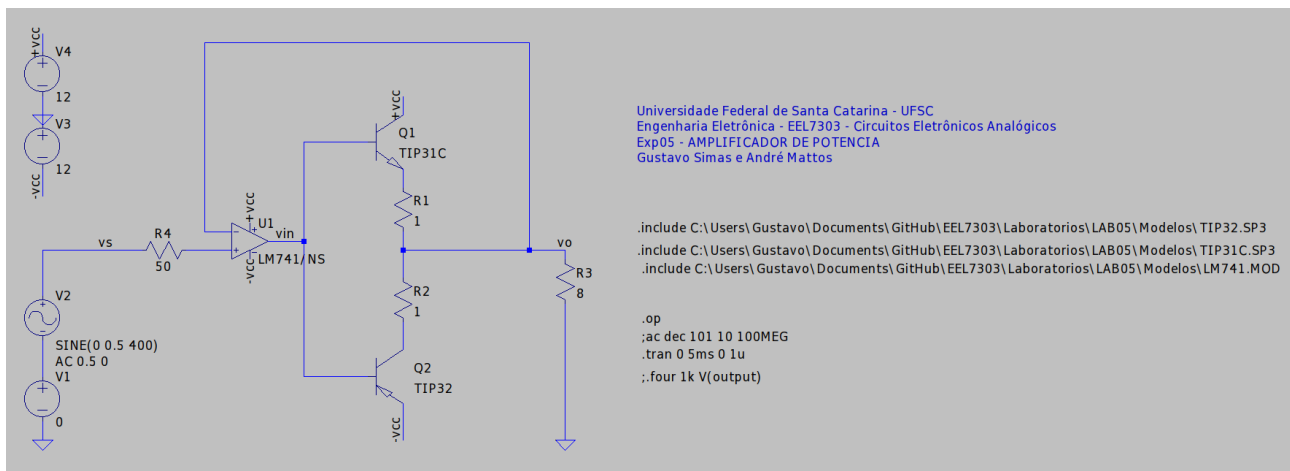


Figura 9 - Amplificador em malha fechada simulado.

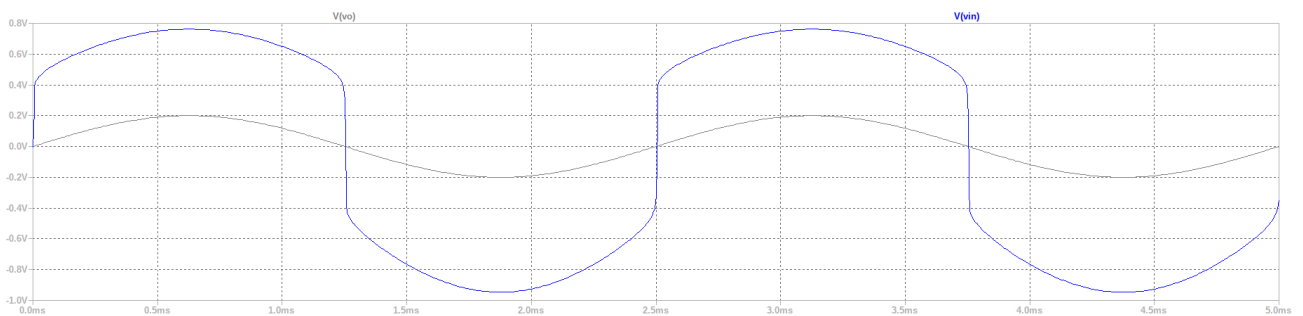


Figura 10 - Formas de onda simuladas da entrada e saída com  $R_L=8$ .

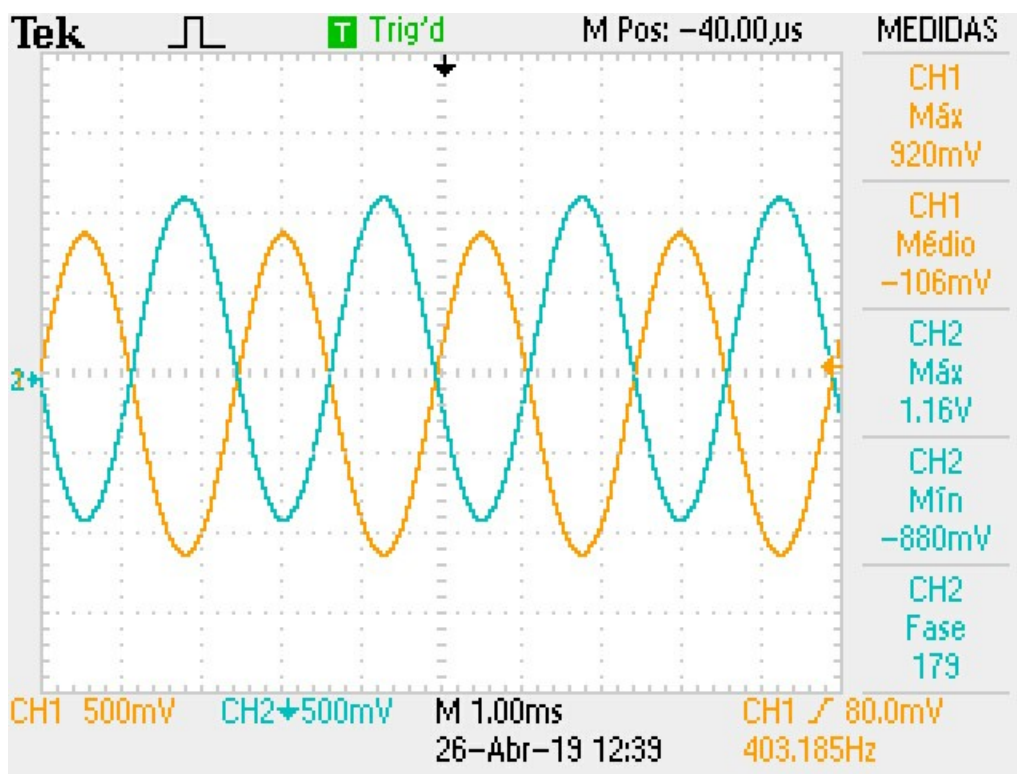


Figura 11 - Formas de onda de entrada(CH1) e saída(CH2).

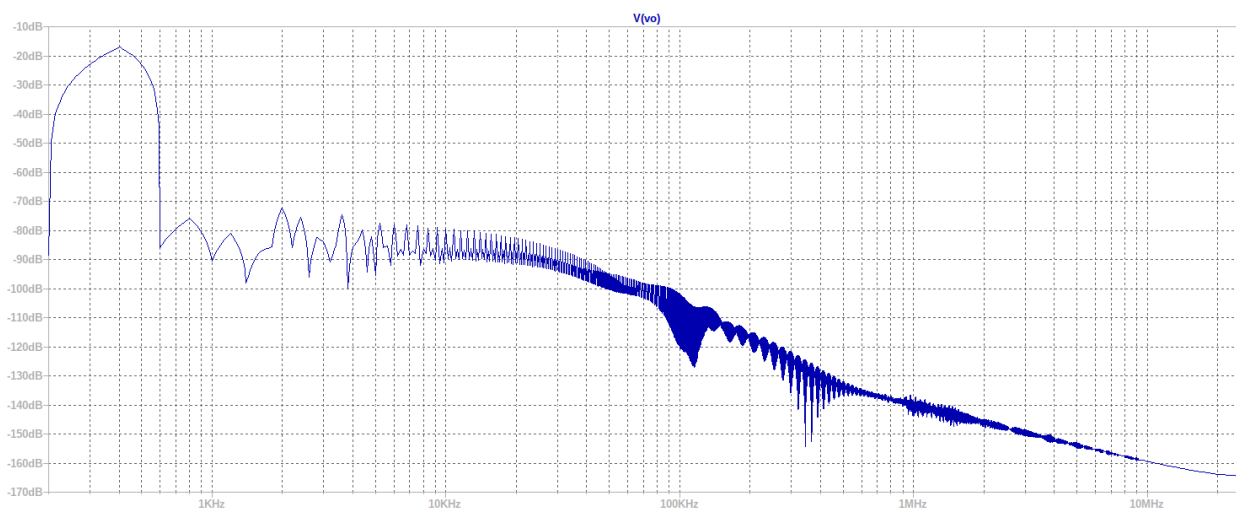


Figura 12 - Espectro de frequência de saída simulado(FFT).

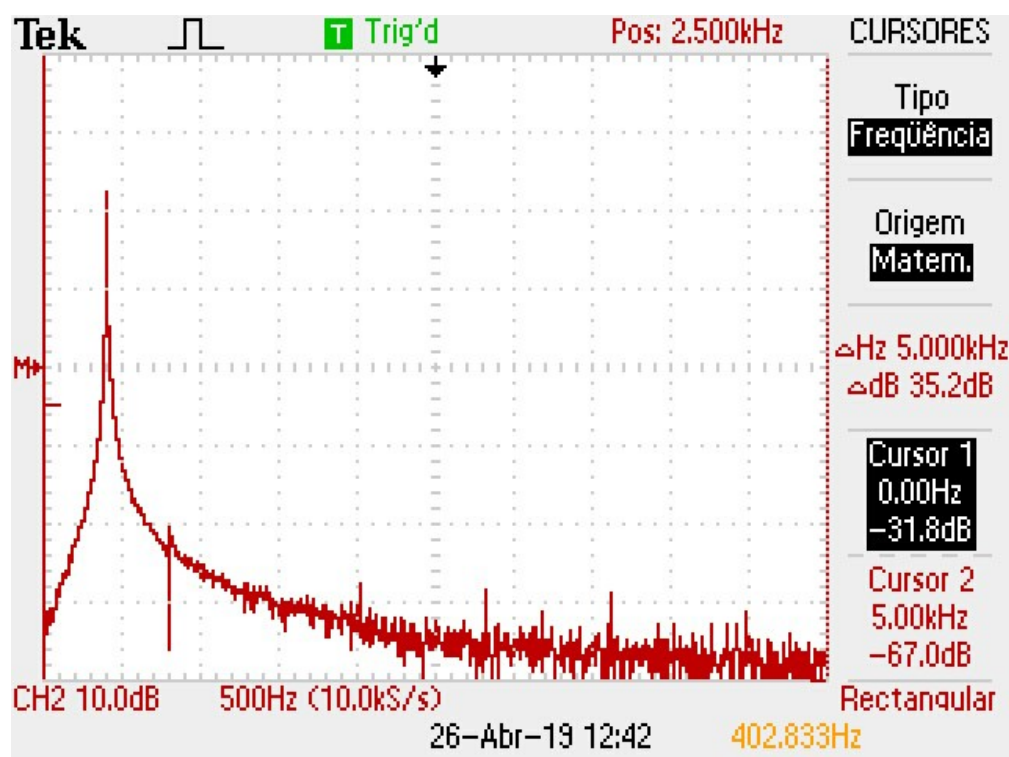


Figura 13 - Espectro de frequência de saída experimental(FFT).

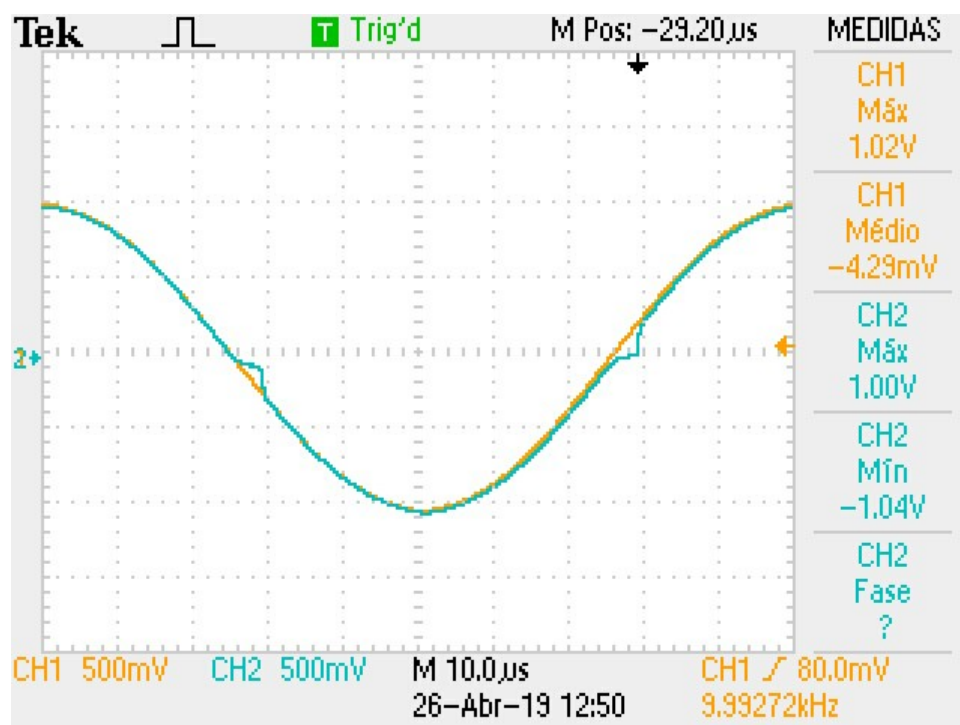


Figura 14 - Forma de onda experimental da saída em 10KHz.

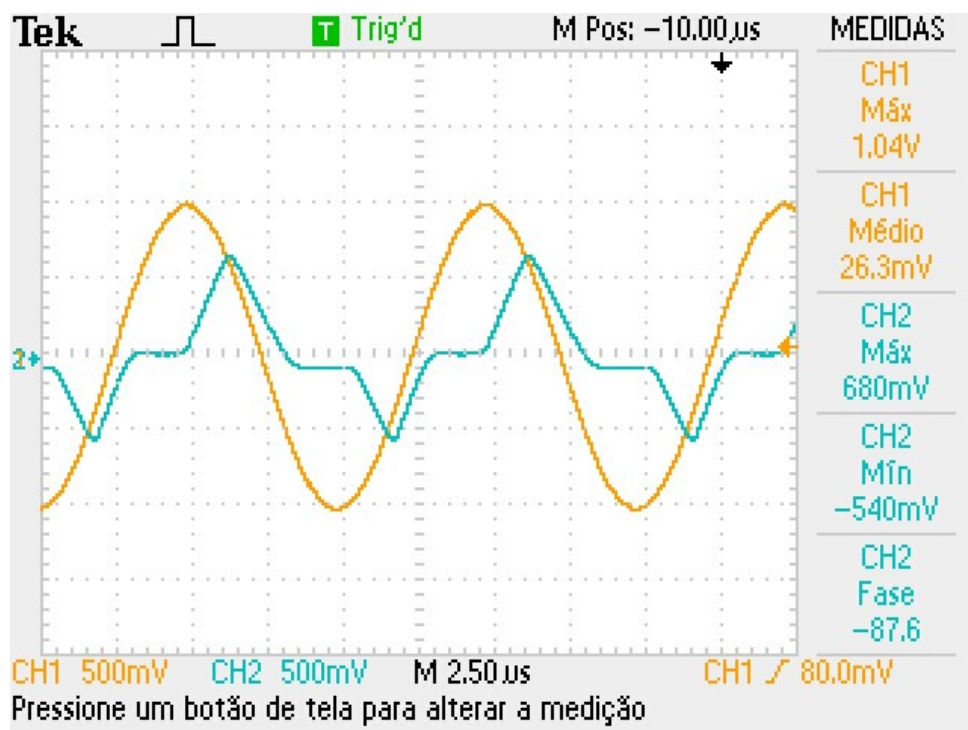


Figura 15 - Forma de onda experimental da saída em 100KHz.

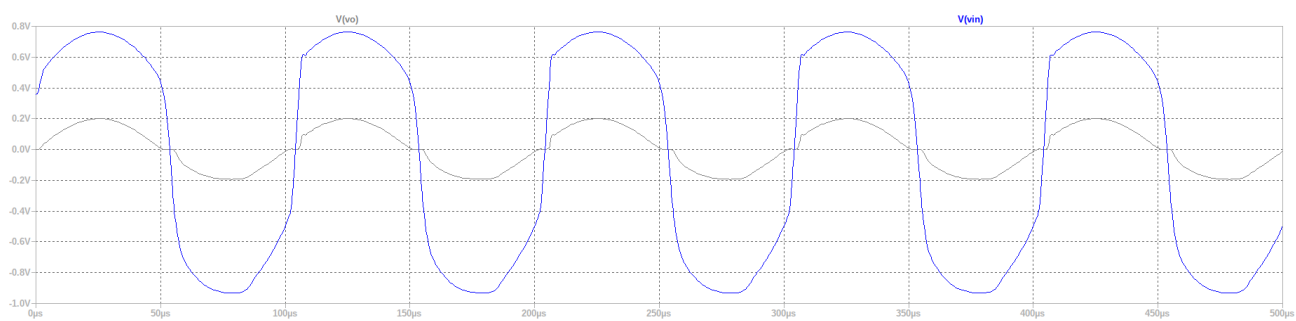


Figura 16 - Forma de onda simulada da saída em 10KHz.

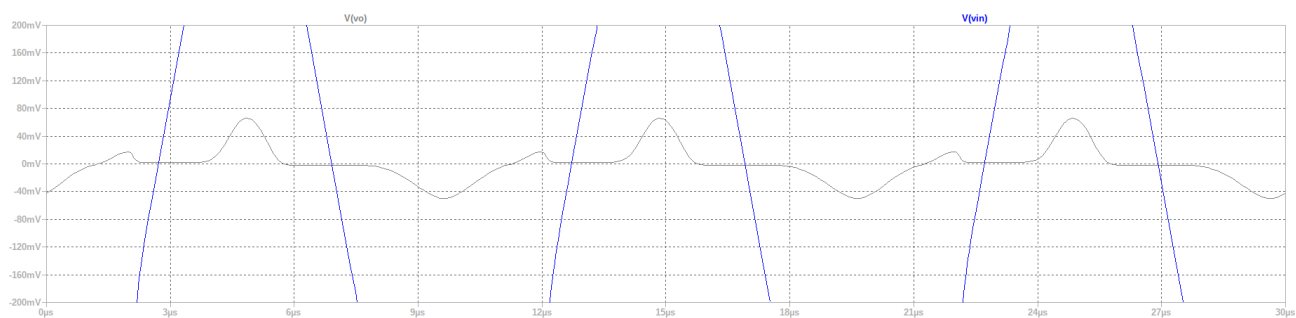


Figura 17 - Forma de onda simulada da saída em 100KHz.