

ANEXO

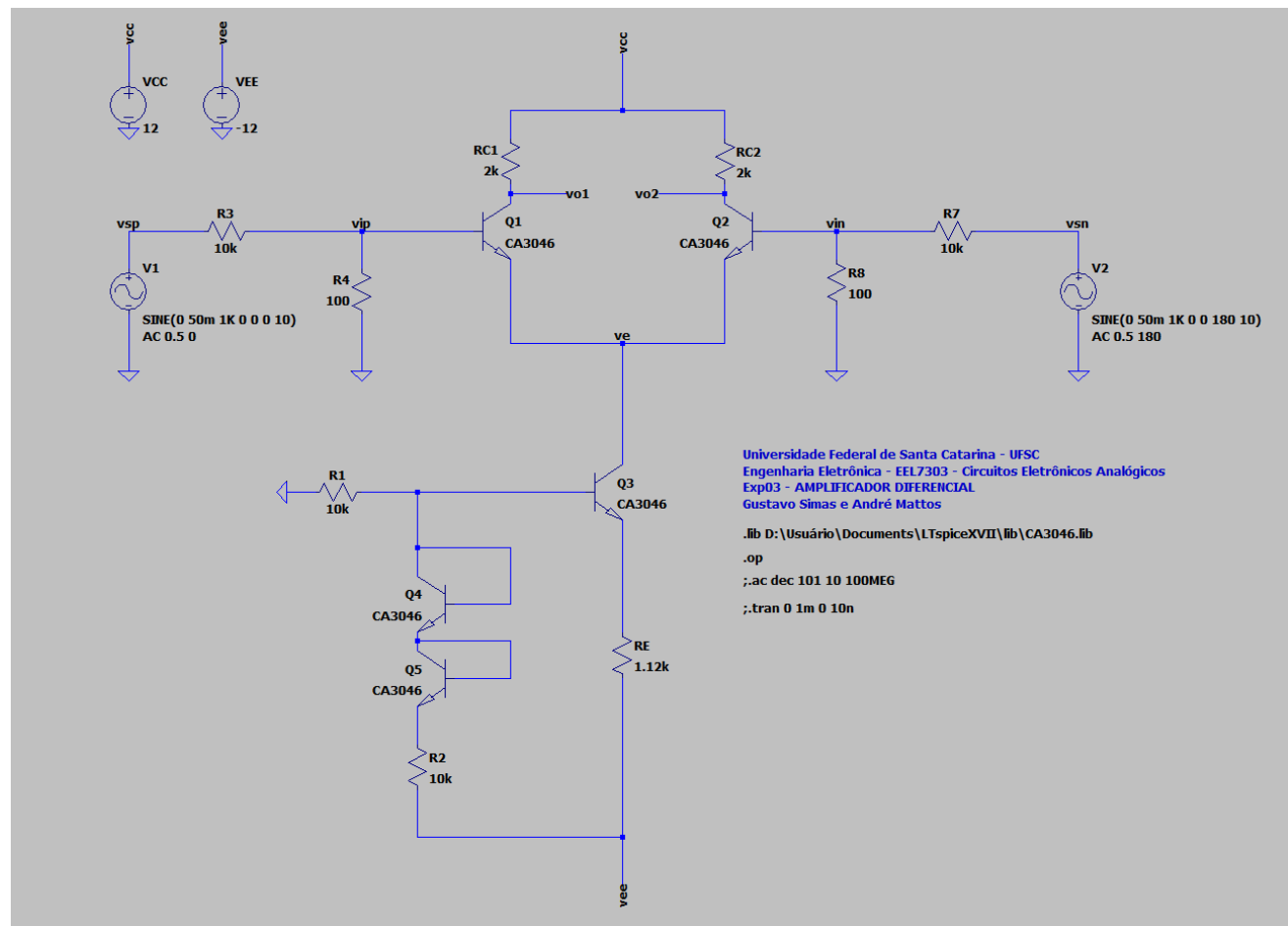


Figura 1 - Circuito Amplificador Diferencial Simulado

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|          --- Operating Point ---
V(vip) :      -0.00223519    voltage
V(vo1) :      6.4926         voltage
V(vcc) :      12             voltage
V(ve) :      -0.68091        voltage
V(vo2) :      6.4926         voltage
V(vee) :      -12            voltage
V(vin) :      -0.00223519    voltage
V(n001) :     -5.59188        voltage
V(n002) :     -6.29039        voltage
V(n003) :     -6.22992        voltage
V(n004) :     -6.86796        voltage
Ic(Q4) :      0.000507747     device_current
Ib(Q4) :      5.45782e-006     device_current
Ie(Q4) :     -0.000513233     device_current
Ic(Q5) :      0.000507747     device_current
Ib(Q5) :      5.45782e-006     device_current
Ie(Q5) :     -0.000513233     device_current
Ic(Q3) :      0.00505188      device_current
Ib(Q3) :      4.59836e-005     device_current
Ie(Q3) :     -0.00509786      device_current
Ic(Q2) :      0.00250336      device_current
Ib(Q2) :      2.25754e-005     device_current
Ie(Q2) :     -0.00252594      device_current
Ic(Q1) :      0.00250336      device_current
Ib(Q1) :      2.25754e-005     device_current
Ie(Q1) :     -0.00252594      device_current
I(R1) :      -0.000559188     device_current
I(Re) :      0.00509786       device_current
I(R2) :      0.000513204      device_current
I(R7) :      2.23519e-007      device_current
I(R8) :      -2.23519e-005     device_current
I(Rc2) :      0.00250336      device_current
I(Rc1) :     -0.00250336      device_current
I(R4) :      2.23519e-005     device_current
I(R3) :      -2.23519e-007     device_current
I(Vee) :      0.00561107      device_current
I(Vcc) :     -0.00500673      device_current

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Figura 2 - Ponto Quiescente Simulado

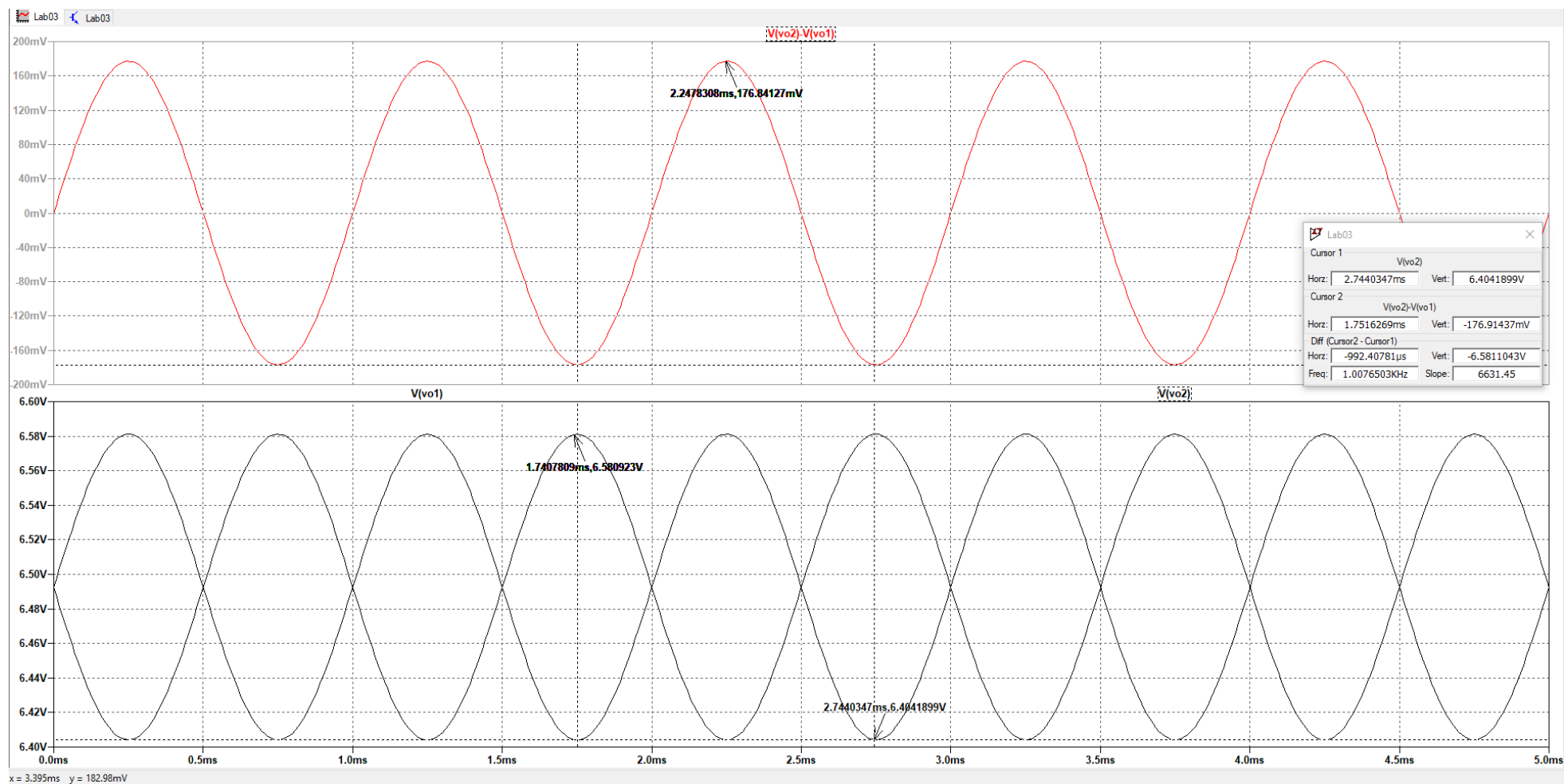


Figura 3 - Sinal Diferencial Simulado

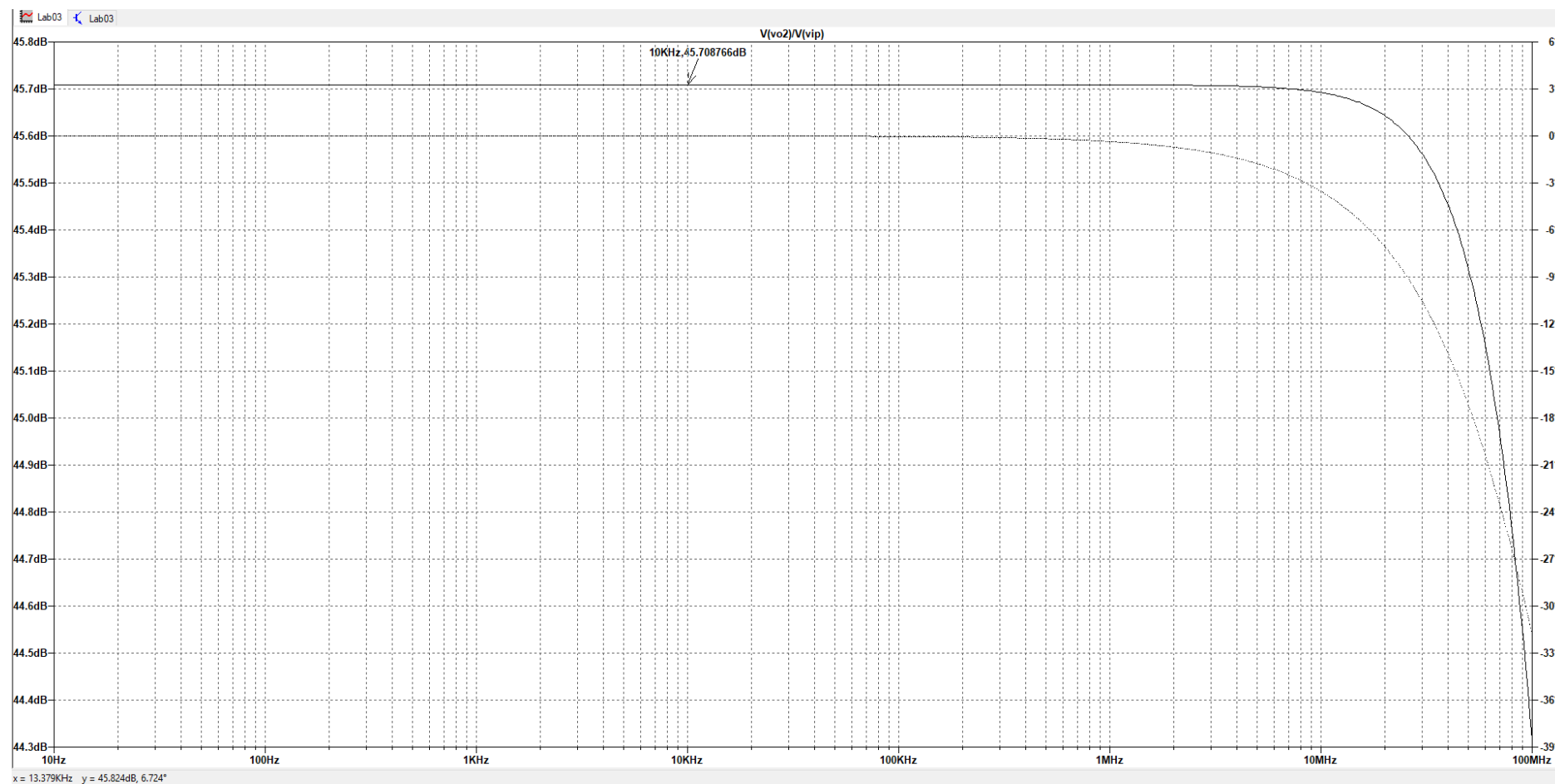


Figura 4 - Ganho Diferencial Adm Simulado

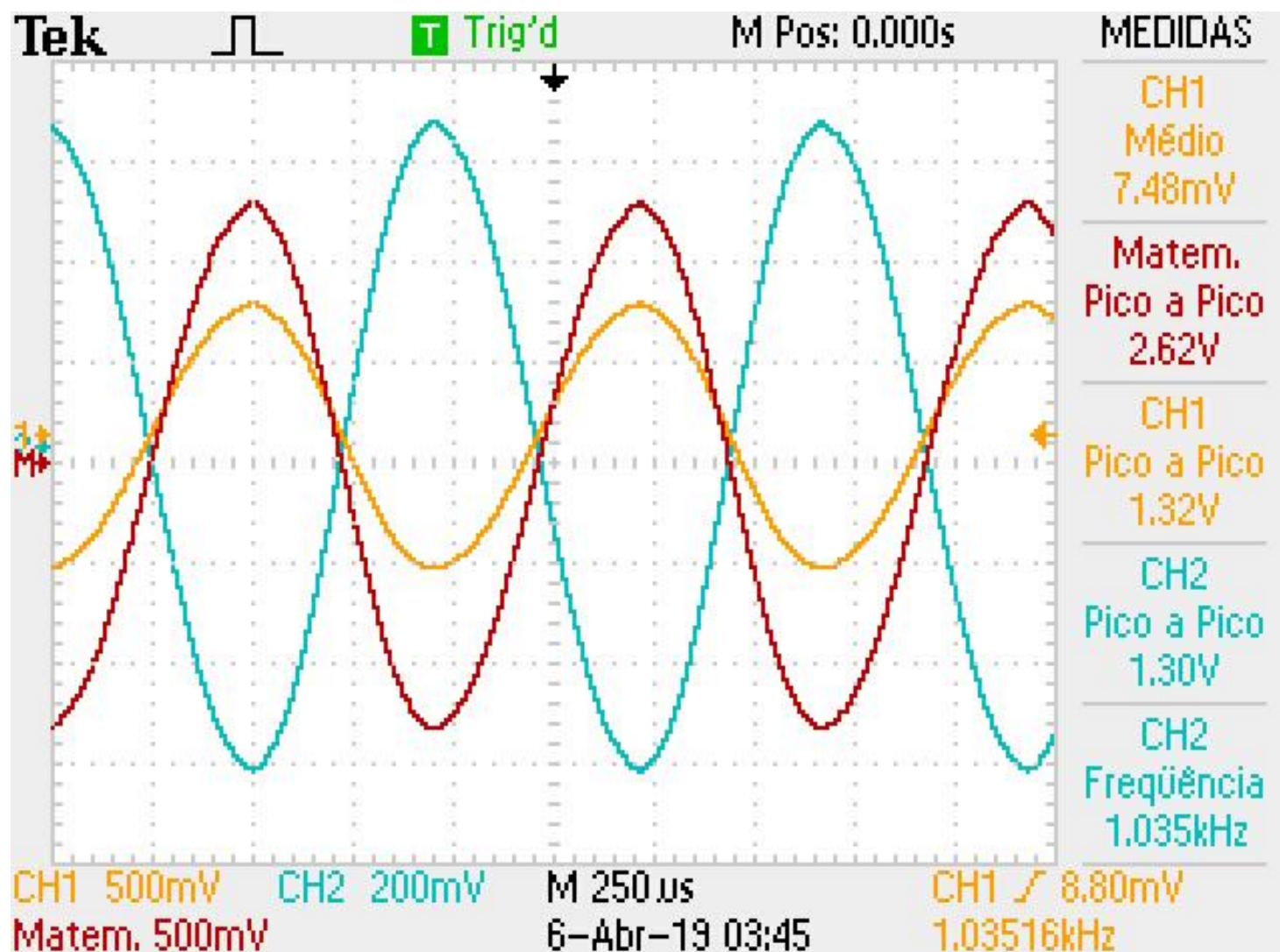


Figura 5 - Ganho Diferencial Adm Experimental

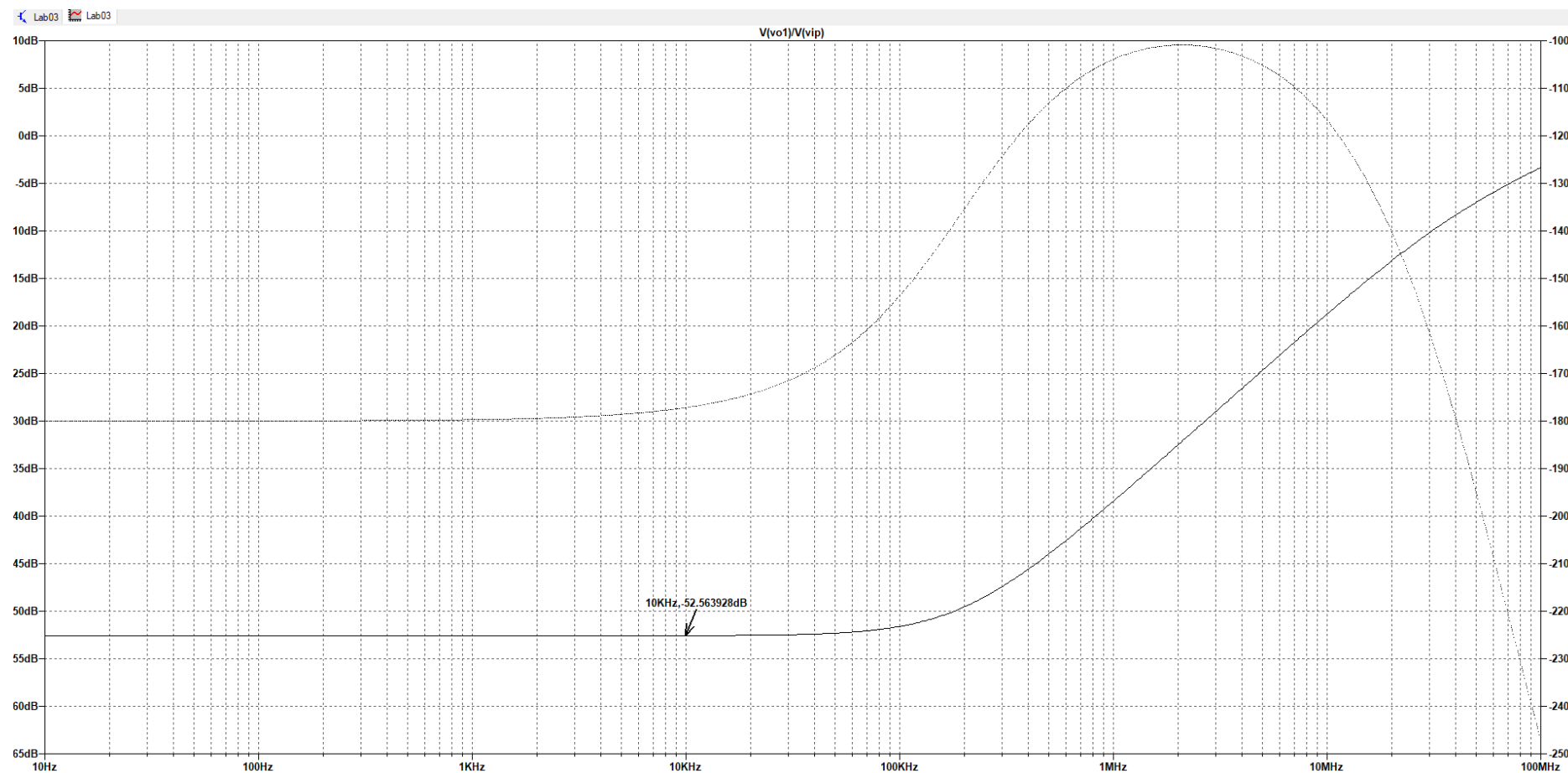


Figura 6 - Ganho Modo-Comum Acm Simulado

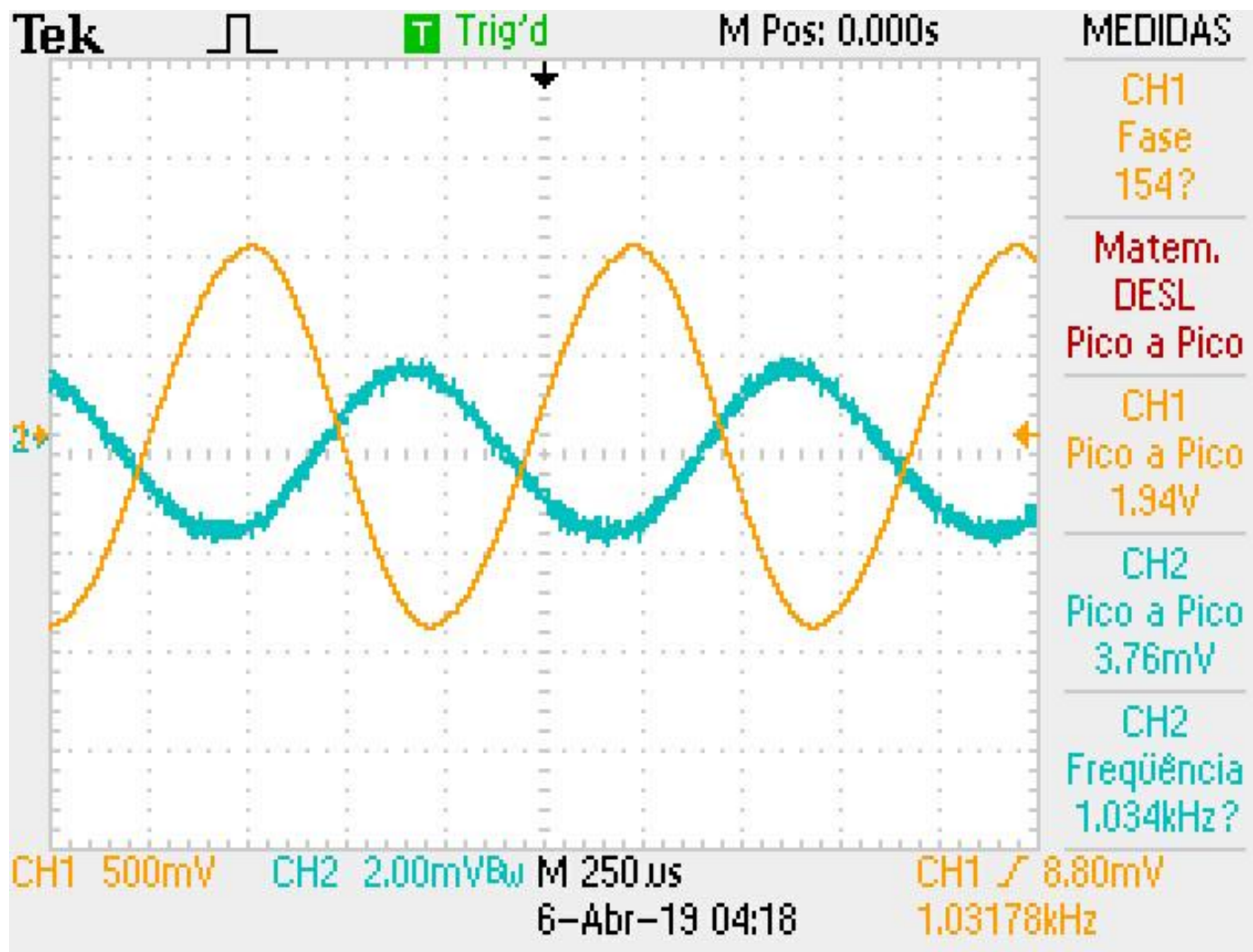


Figura 7 - Ganho Modo-Comum Acm Experimental

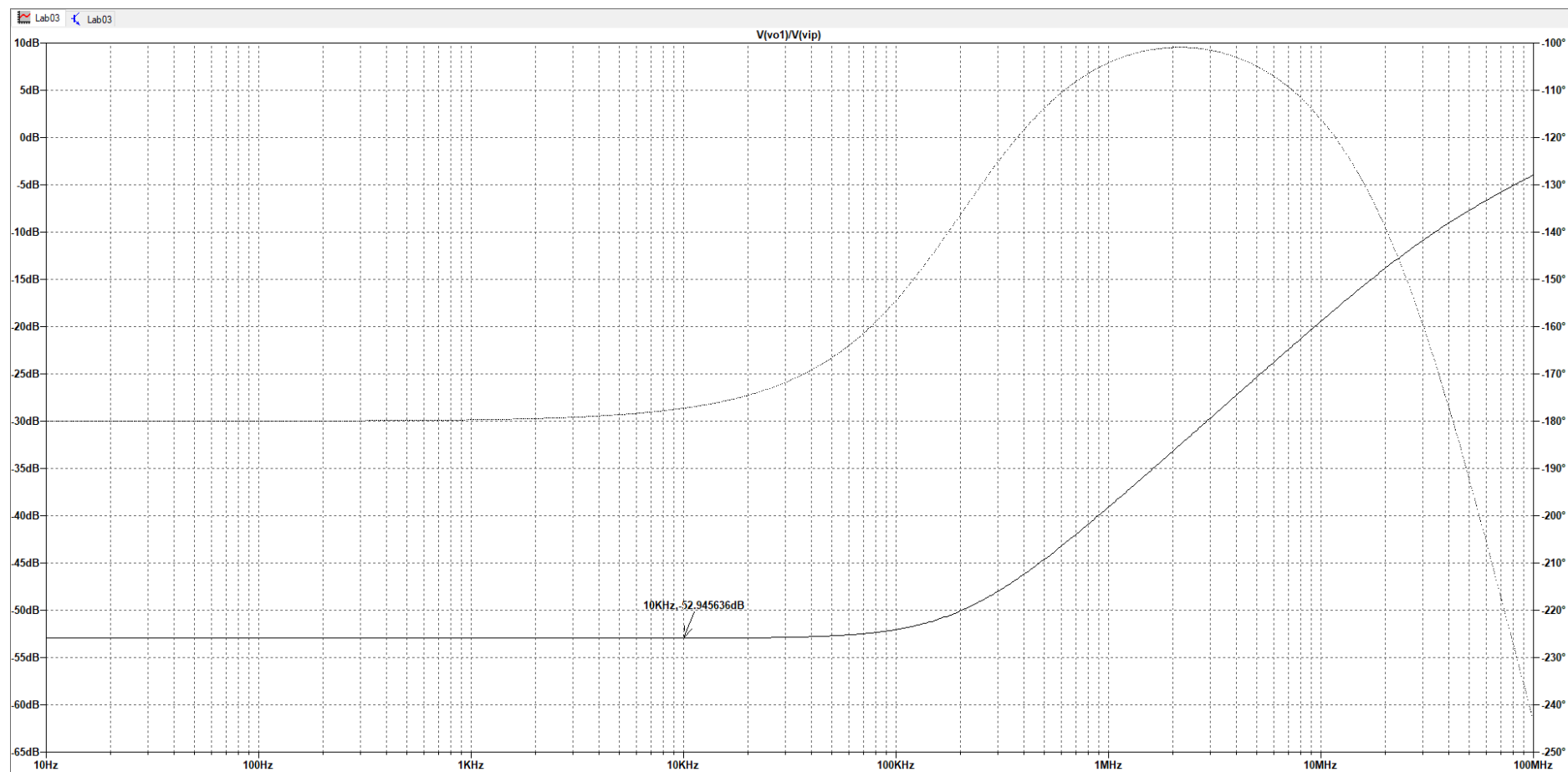


Figura 8 - Ganho Modo-Comum Descasado Simulado

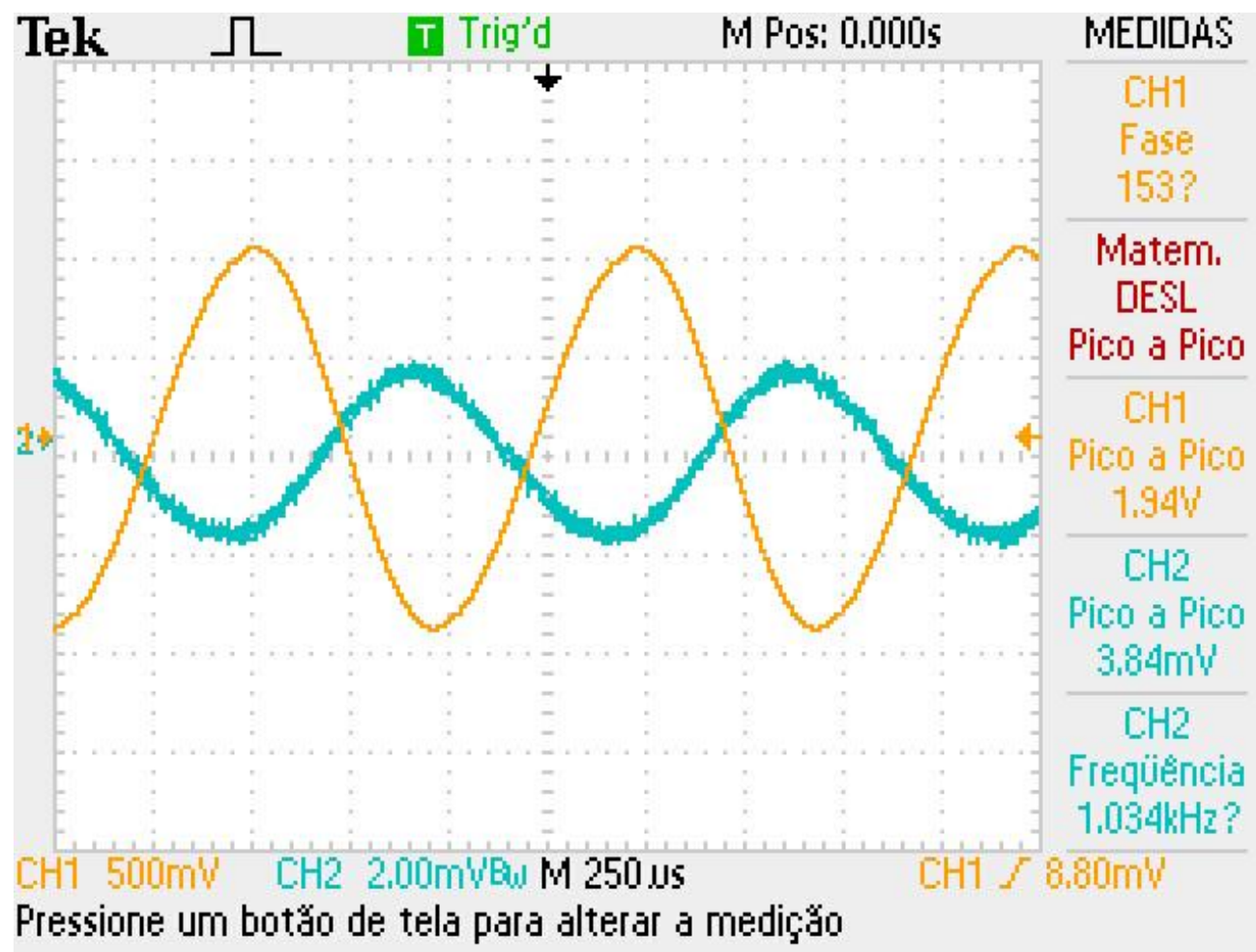


Figura 9 - Ganho Modo-Comum Descasado Experimental

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Circuit: * D:\Usuário\Documents\GitHub\EEL7303\Laboratorios\LAB03\Simulação\Lab03.asc

Warning: Multiple definitions of model "ca3046" Type: BJT
Direct Newton iteration for .op point succeeded.
N-Period=1
Fourier components of V(vol)
DC component:6.84561

Harmonic      Frequency      Fourier      Normalized      Phase      Normalized
Number        [Hz]          Component    Component       [degree]    Phase [deg]
1             1.000e+03     4.798e+00    1.000e+00       180.00°     0.00°
2             2.000e+03     8.795e-04    1.833e-04       -89.93°     -269.93°
3             3.000e+03     4.192e-01    8.737e-02       179.99°     -0.01°
4             4.000e+03     2.375e-04    4.950e-05       -90.34°     -270.34°
5             5.000e+03     3.938e-02    8.207e-03       179.97°     -0.03°
6             6.000e+03     4.707e-05    9.811e-06       -94.07°     -274.06°
7             7.000e+03     2.929e-03    6.105e-04       -179.95°     -359.95°
8             8.000e+03     1.343e-05    2.798e-06       -109.77°     -289.77°
9             9.000e+03     1.273e-04    2.653e-05       -177.00°     -356.99°

Total Harmonic Distortion: 8.775596%(8.775599%)

Date: Wed Apr 10 09:03:30 2019
Total elapsed time: 15.595 seconds.

tnom = 27
temp = 27
method = modified trap
totiter = 1000041
traniter = 1000034
tranpoints = 500018
accept = 500018
rejected = 0
matrix size = 20
fillins = 0
solver = Normal
Matrix Compiler1: 1.20 KB object code size 0.2/0.1/[0.1]
Matrix Compiler2: 1.59 KB object code size 0.1/0.2/[0.1]

```

Figura 10 - Distorção Harmônica Diferencial

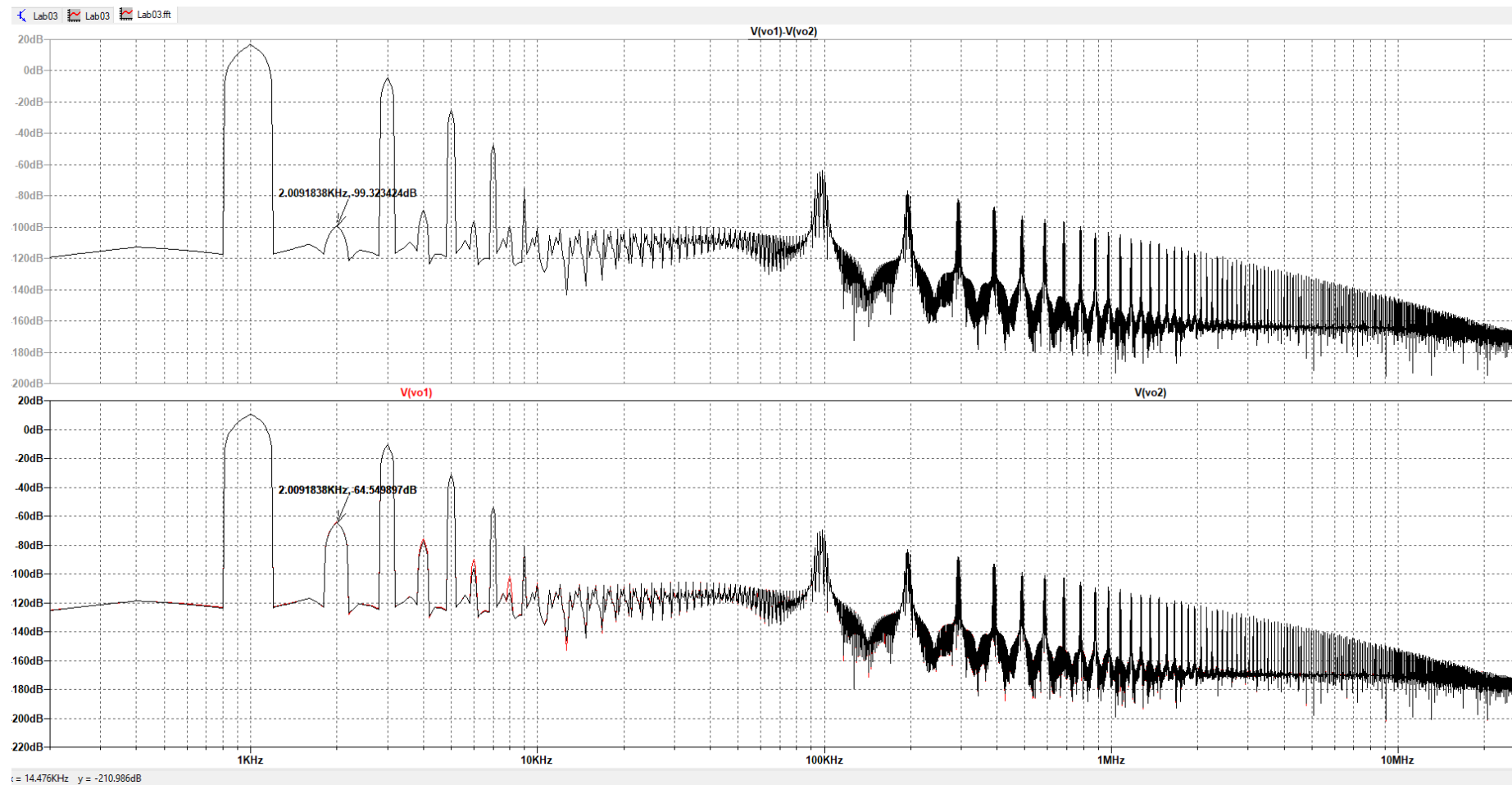


Figura 11 - Espectro de Frequência Diferencial