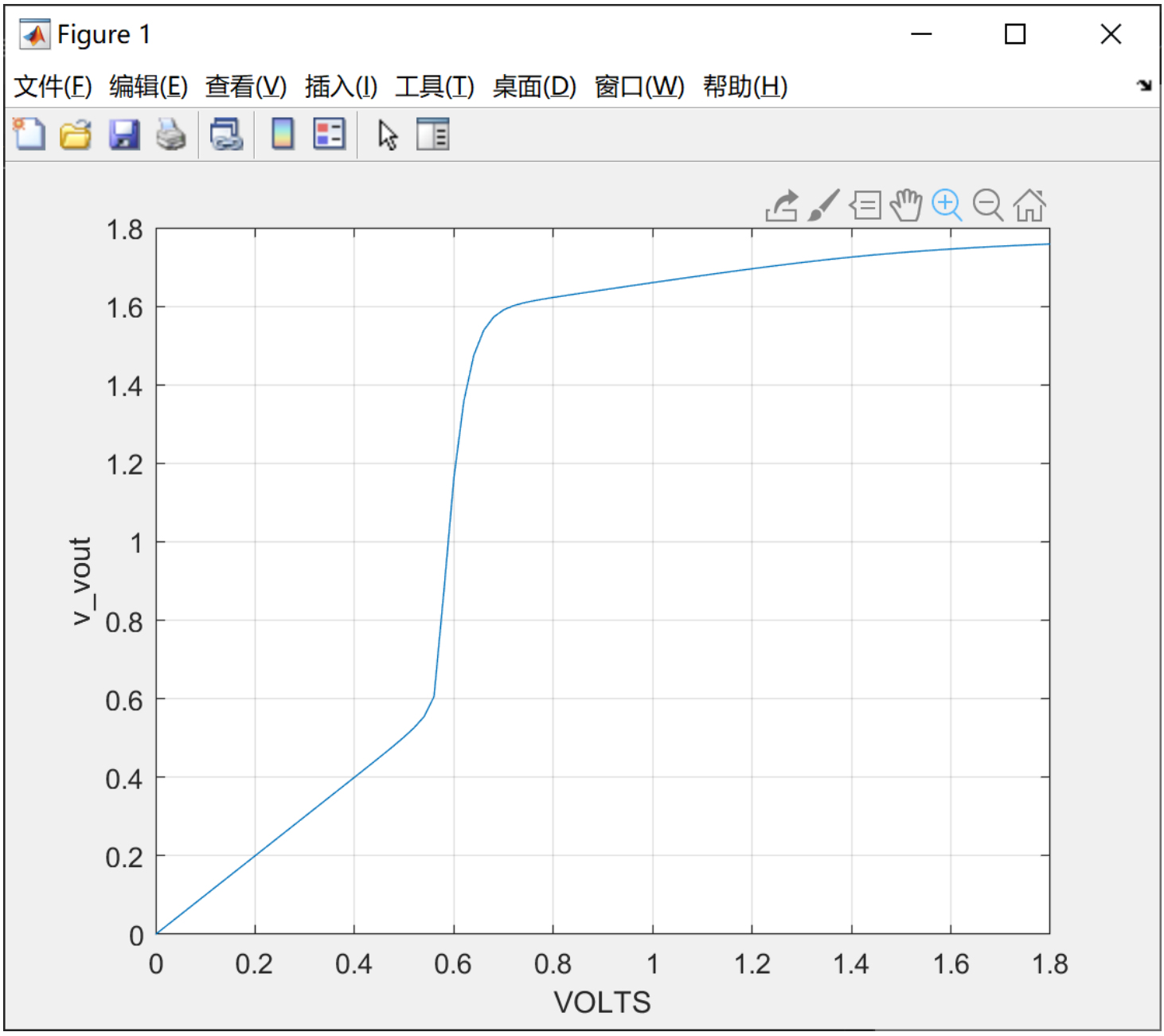
6.13

(1)

(a)



(b)

$$V_{DS1} = 2.8988mV, V_{GS1} = 200mV, I_{D1} = 5.5455pA$$

(c)

$g_{m1} = 169.7475pS, g_{ds1} = 1.8420nS, C_{gs1} = 349.8917aF, C_{gd1} = 349.8707aF, R = 0.7052\Omega$

(2)

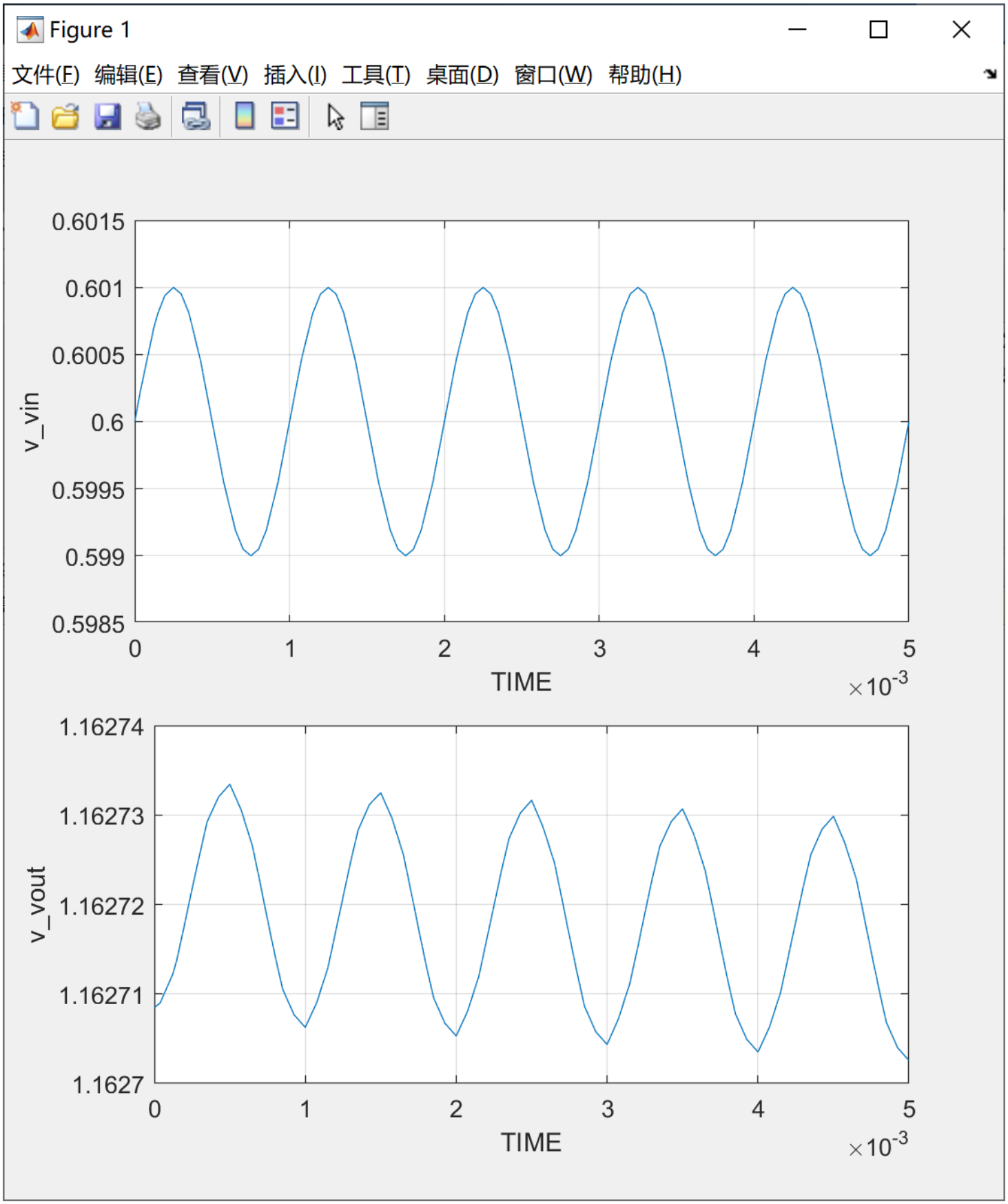


Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
0.6015
0.601
0.6005
0.6
0.5995
0.599
0.5985
v_vin
0
1
2
3
4
5
TIME
×10-3
1.16274
1.16273
1.16272
1.16271
1.1627
v_vout
0
1
2
3
4
5
TIME
×10-3

(3)

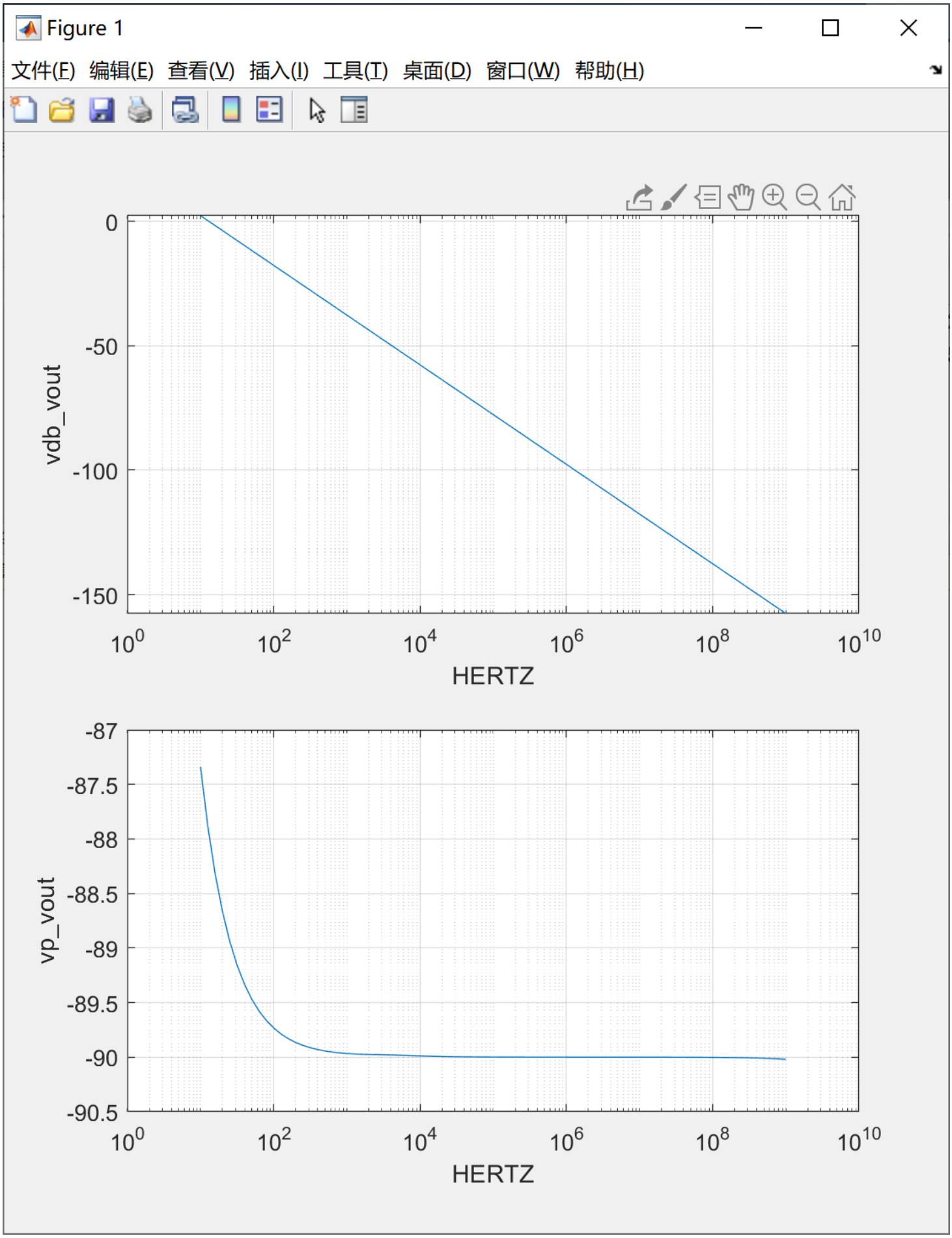
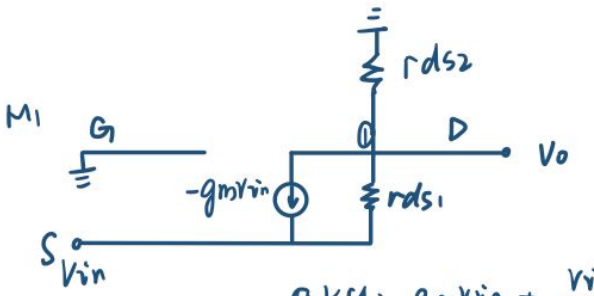


Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
0
-50
-100
-150
vdb_vout
10^0
10^2
10^4
10^6
10^8
10^{10}
HERTZ
-87
-87.5
-88
-88.5
-89
-89.5
-90
-90.5
vp_vout
10^0
10^2
10^4
10^6
10^8
10^{10}
HERTZ

6.14

(1)



$$g_m v_{in} + \frac{V_{in}}{r_{ds1}} = V_o (g_{ds1} + g_{ds2})$$

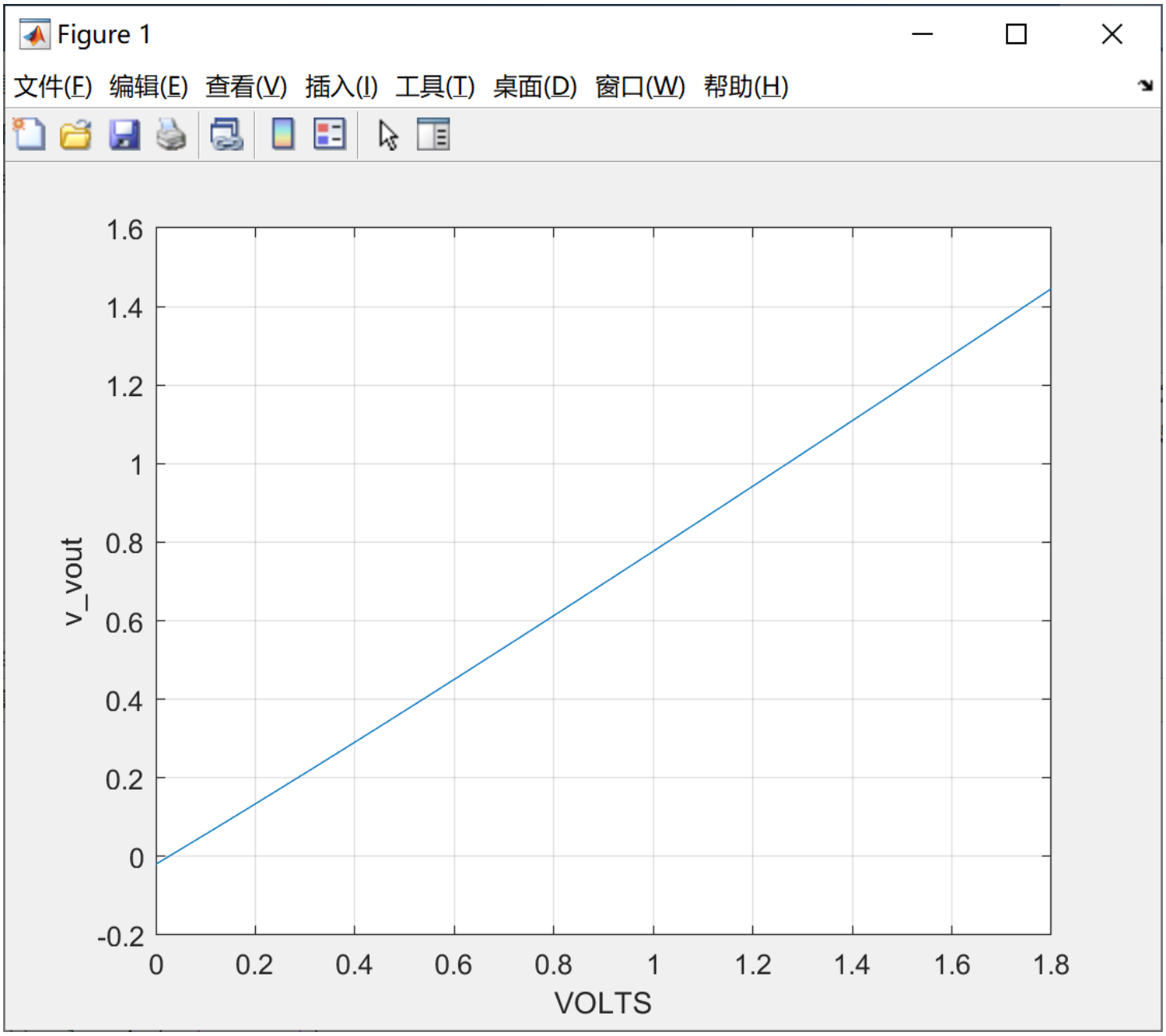
KCL: $g_m v_{in} + \frac{v_{in} - V_o}{r_{ds1}} = \frac{V_o}{r_{ds2}}$.

$$V_o = \frac{V_{in}(g_m + g_{ds1})}{g_{ds1} + g_{ds2}} \qquad \therefore A_o = \frac{g_m + g_{ds1}}{g_{ds1} + g_{ds2}}$$

6.15

(1)

(a)



(b)

$$V_{DS1} = 1.4294V, V_{GS1} = 129.3699mV, I_{D1} = 36.7917pA$$

(c)

$$g_{m1} = 1.1127nS, g_{ds1} = 23.0864pS, C_{gs1} = 141.6032aF, C_{gd1} = 141.5776aF, R = 0.1327\Omega$$

(2)

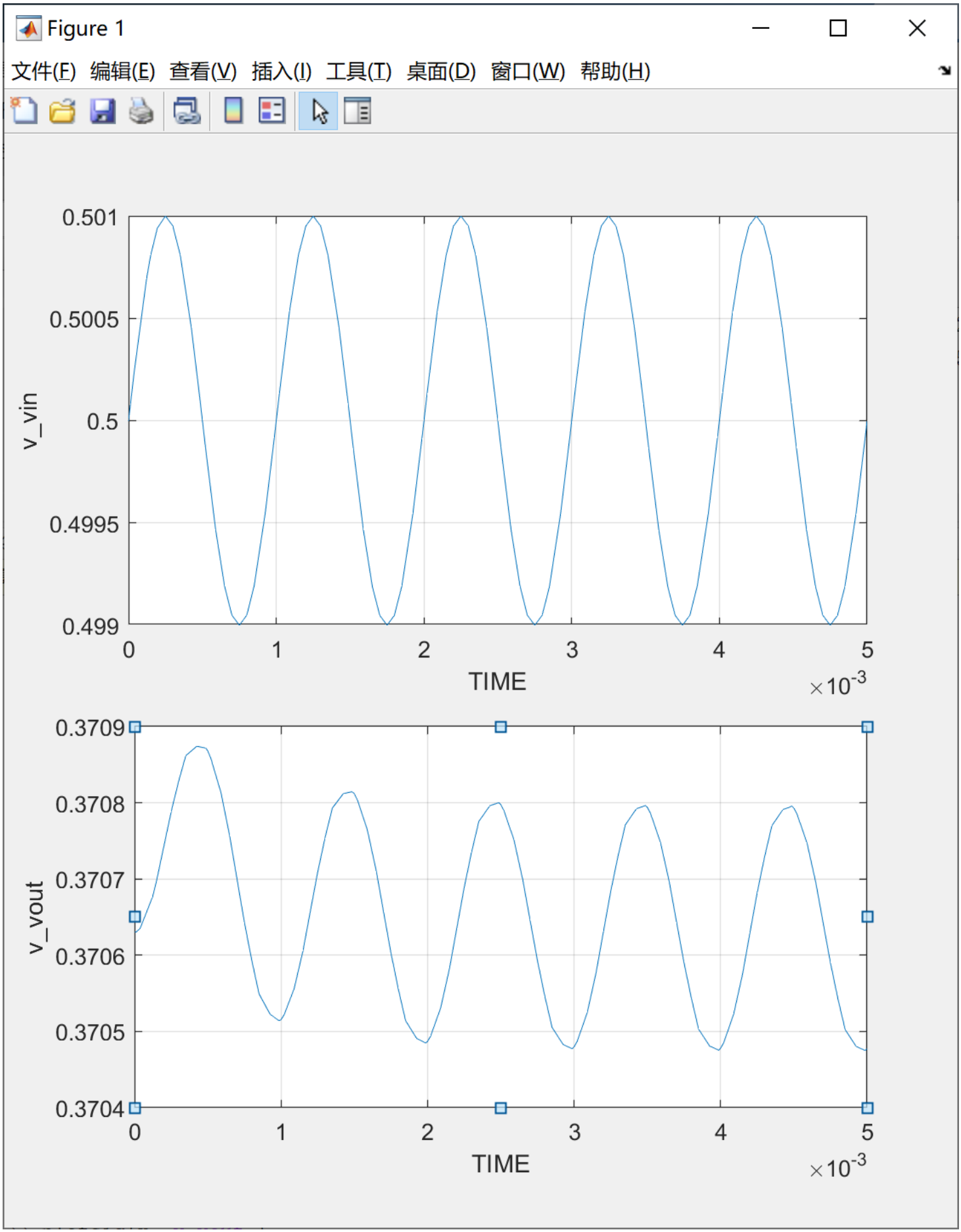
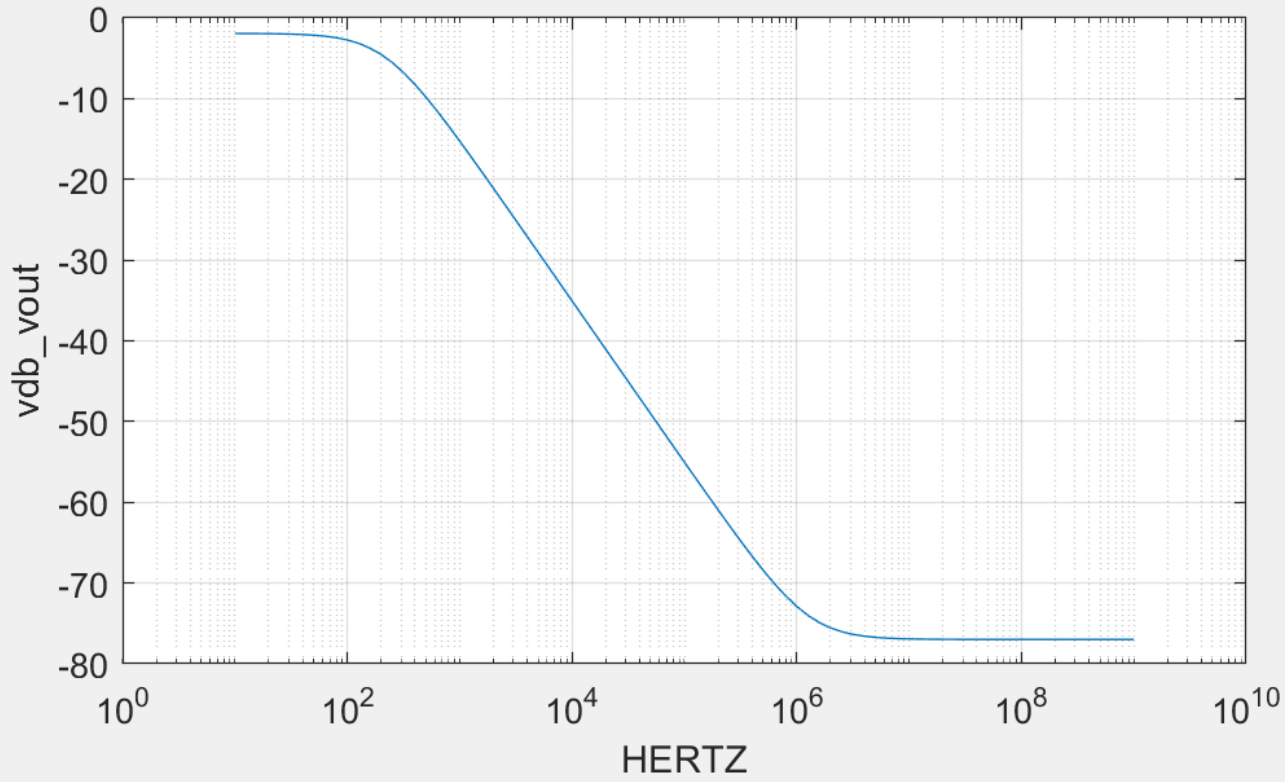


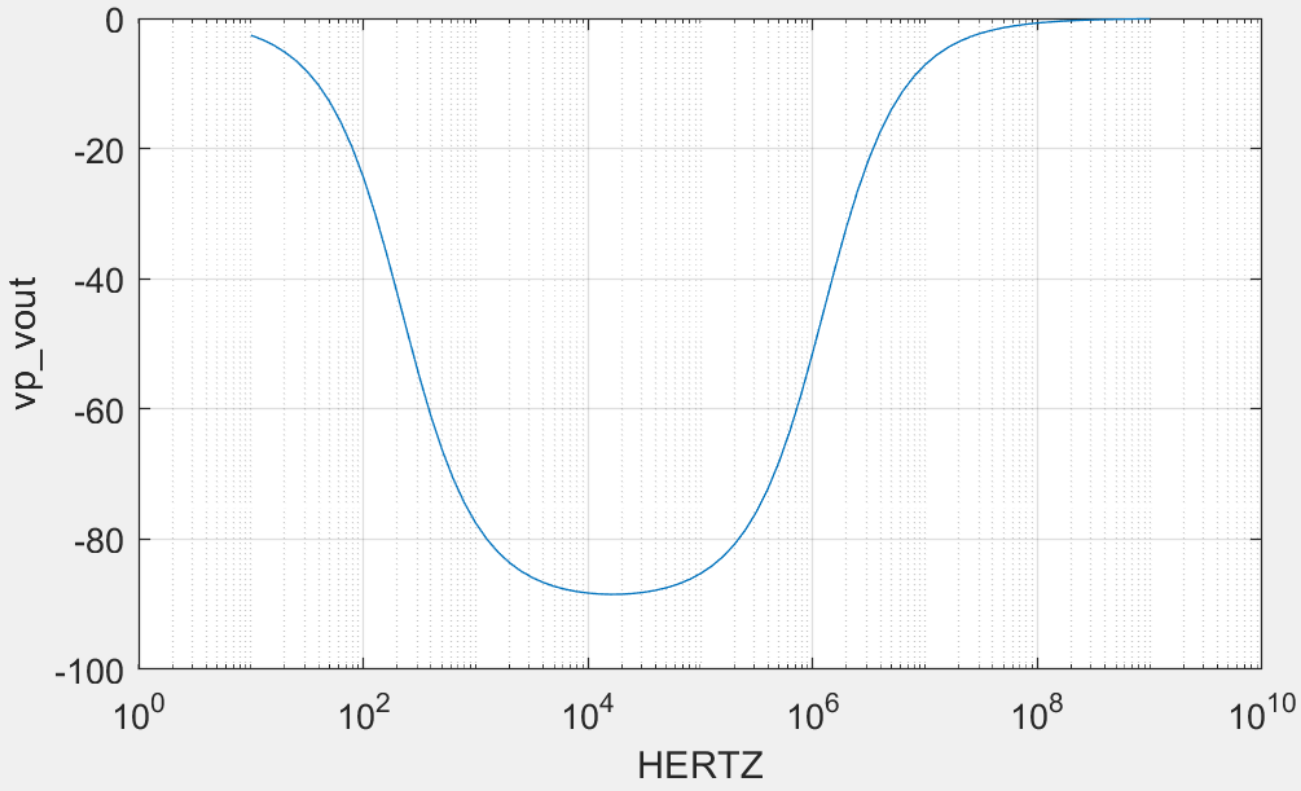
Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
0.501
0.5005
0.5
0.4995
0.499
v_vin
0
1
2
3
4
5
TIME
×10-3
0.3709
0.3708
0.3707
0.3706
0.3705
0.3704
v_vout
0
1
2
3
4
5
TIME
×10-3

(3)

Figure 1

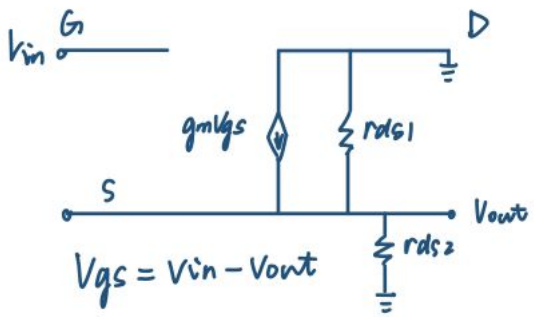
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)





6.16

(1)



KCL: $g_m v_{gs} - V_{out}(g_{ds1} + g_{ds2}) = 0$

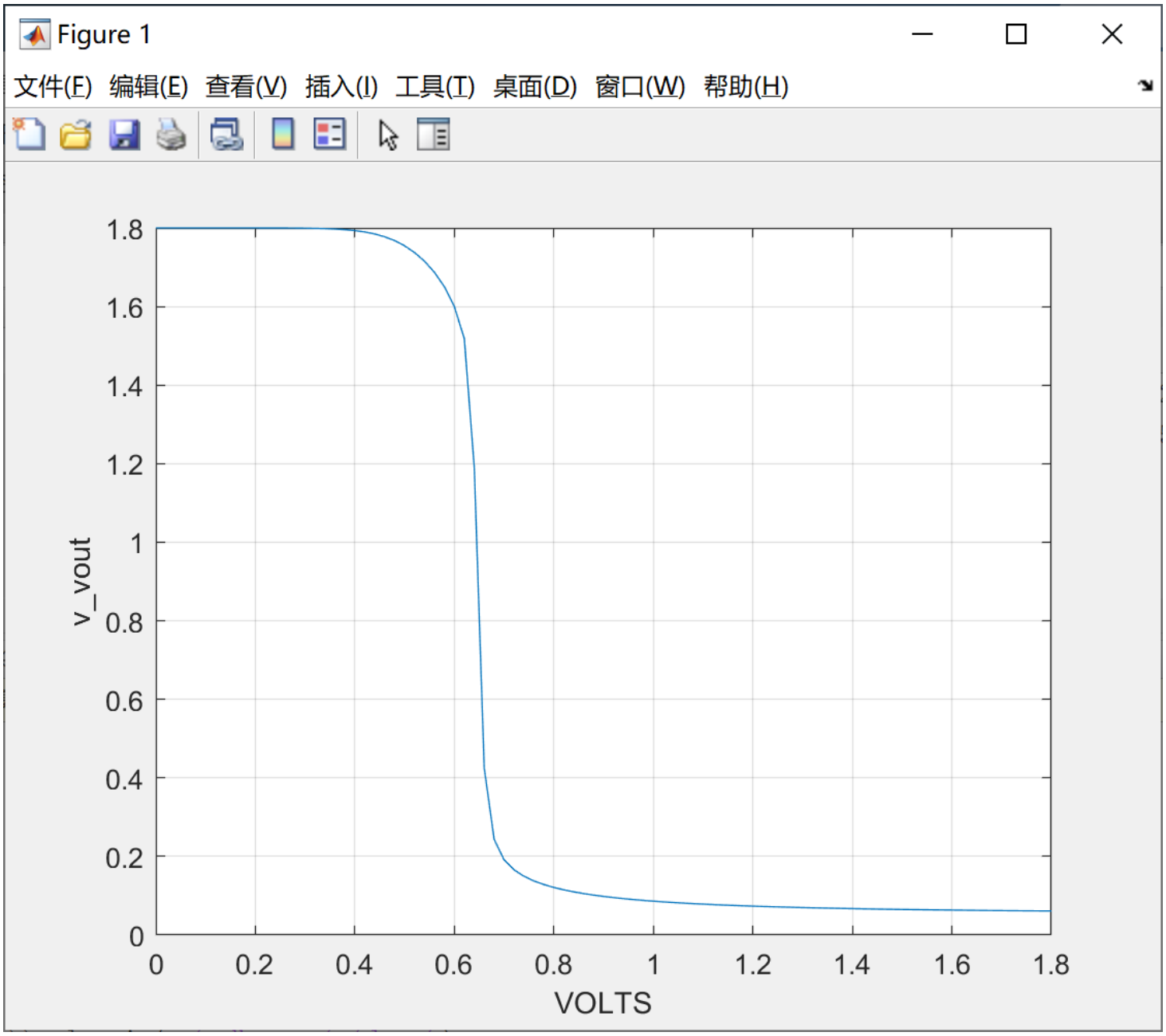
$g_m v_{in} = V_{out}(g_m + g_{ds1} + g_{ds2})$

$$A_0 = \frac{g_m}{g_m + g_{ds1} + g_{ds2}}$$

6.17

(1)

(a)



(b)

$$V_{DS1} = 589.0093mV, V_{GS1} = 500mV, I_{D1} = 2.7624uA$$
$$V_{DS2} = 1.1655V, V_{GS2} = 610.9907mV, I_{D2} = 2.7624uA$$

(c)

$$g_{m1} = 43.2643uS, g_{ds1} = 976.3089nS, C_{gs1} = 476.3285aF, C_{gd1} = 139.0567aF$$
$$g_{m2} = 44.0937uS, g_{ds2} = 1.0686uS, C_{gs2} = 461.8332aF, C_{gd2} = 137.4658aF$$

(2)

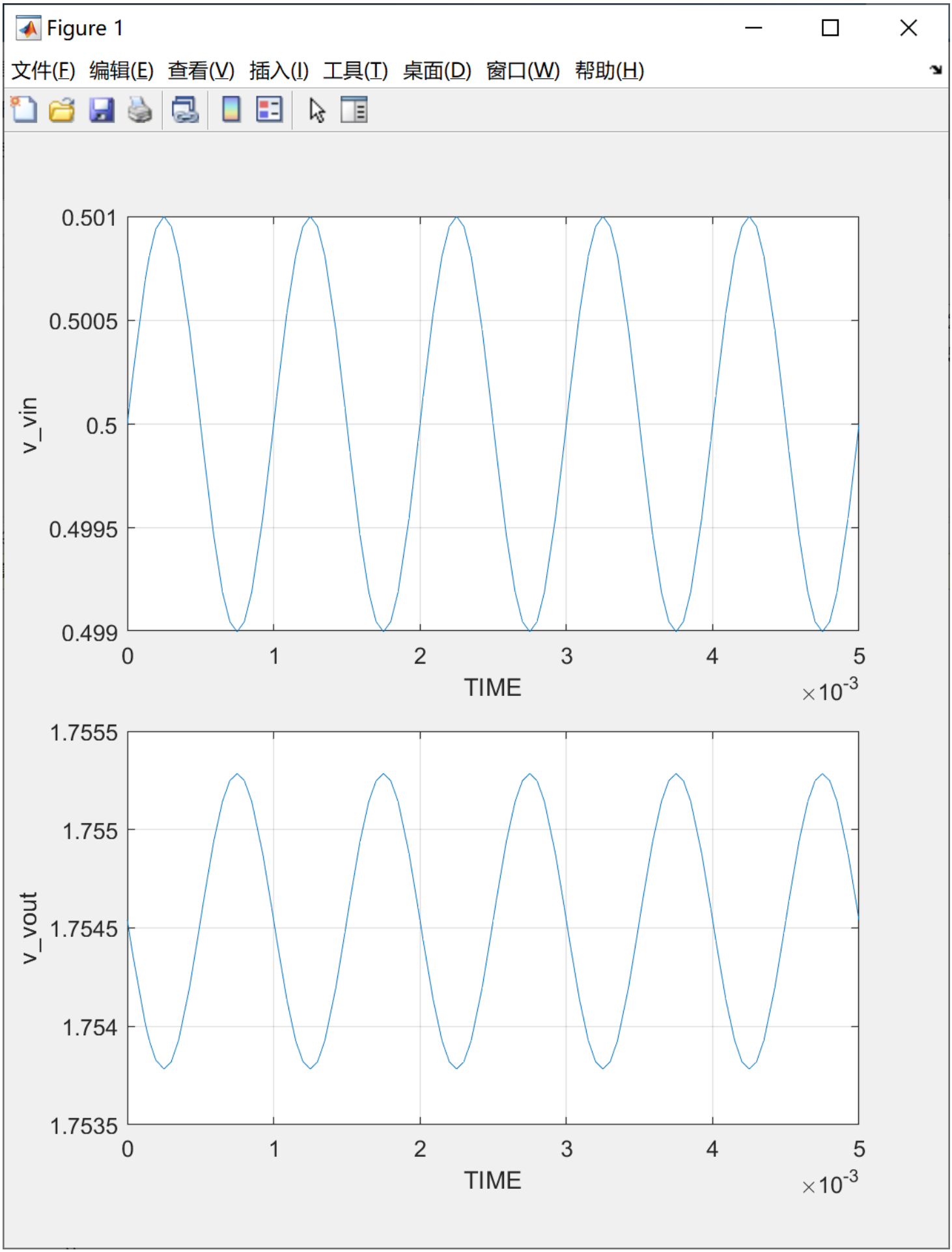


Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
0.501
0.5005
0.5
0.4995
0.499
v_vin
0
1
2
3
4
5
TIME
×10-3
1.7555
1.755
1.7545
1.754
1.7535
v_vout
0
1
2
3
4
5
TIME
×10-3

(3)

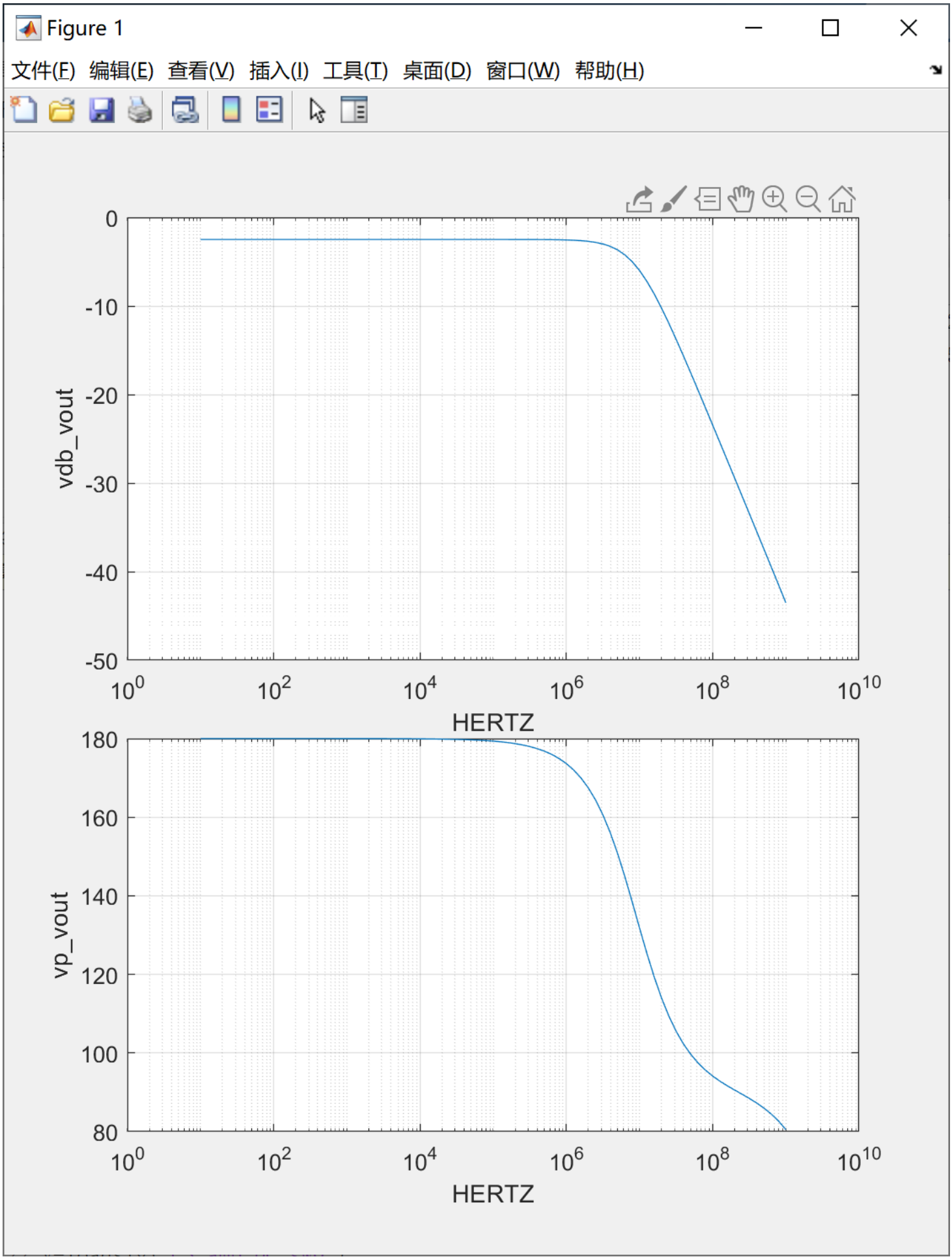
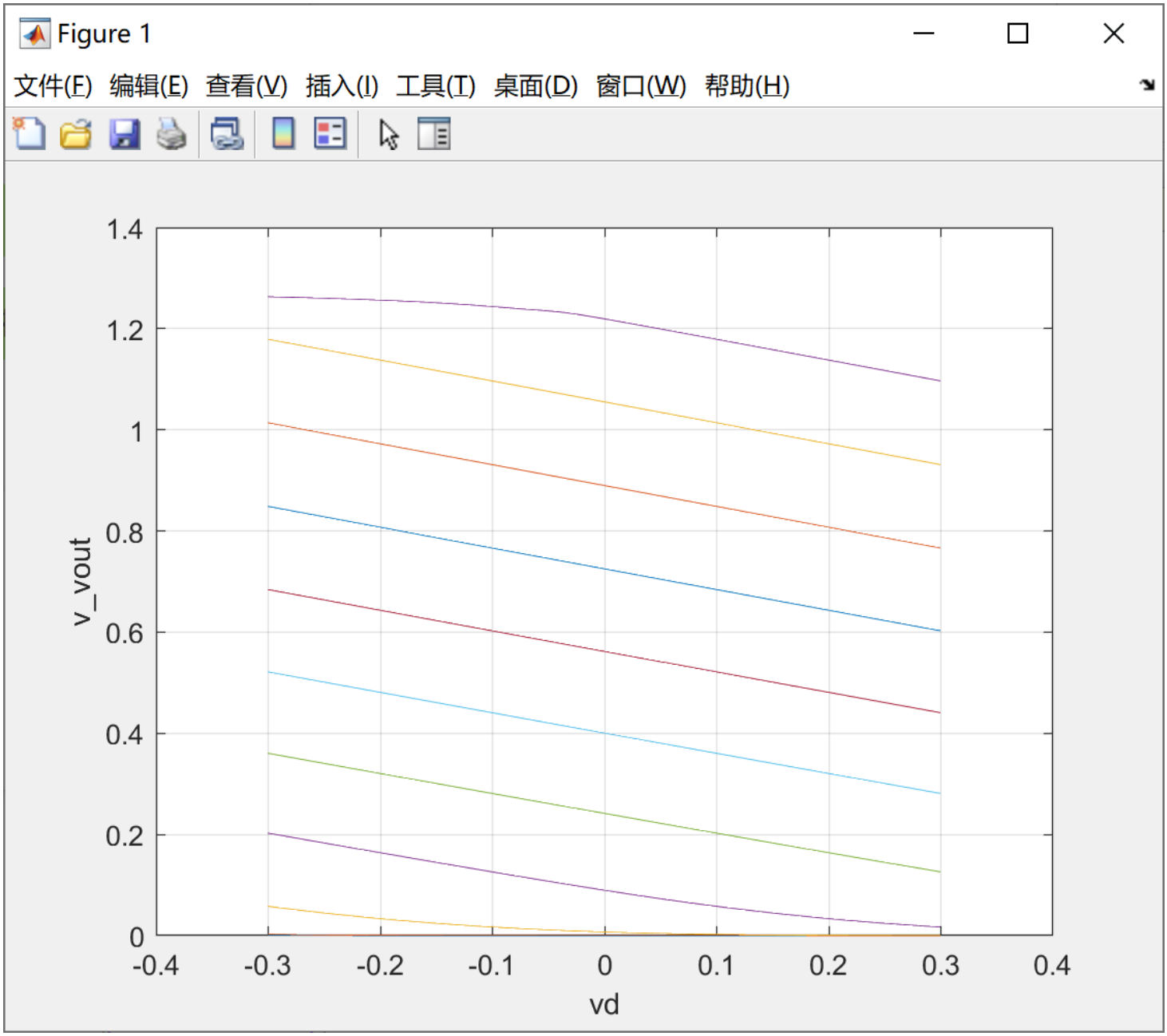


Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
0
-10
-20
-30
-40
-50
vdb_vout
10^0
10^2
10^4
10^6
10^8
10^{10}
HERTZ
180
160
140
120
100
80
vp_vout
10^0
10^2
10^4
10^6
10^8
10^{10}
HERTZ

6.19

(1)

(a)



(b)

$$V_{DS1} = 1.4337V, V_{GS1} = 589.5860mV, I_{D1} = 5.0739uA$$
$$V_{DS2} = -2.6100nV, V_{GS2} = 689.5860mV, I_{D2} = -360.4110fA$$

(c)

$$g_{m1} = 75.7565uS, g_{ds1} = 1.6412uS, C_{gs1} = 700.7659aF, C_{gd1} = 202.6333aF$$
$$g_{m2} = 2.4232pS, g_{ds2} = 138.2442uS, C_{gs2} = 553.2579aF, C_{gd2} = 641.7668aF$$

(2)

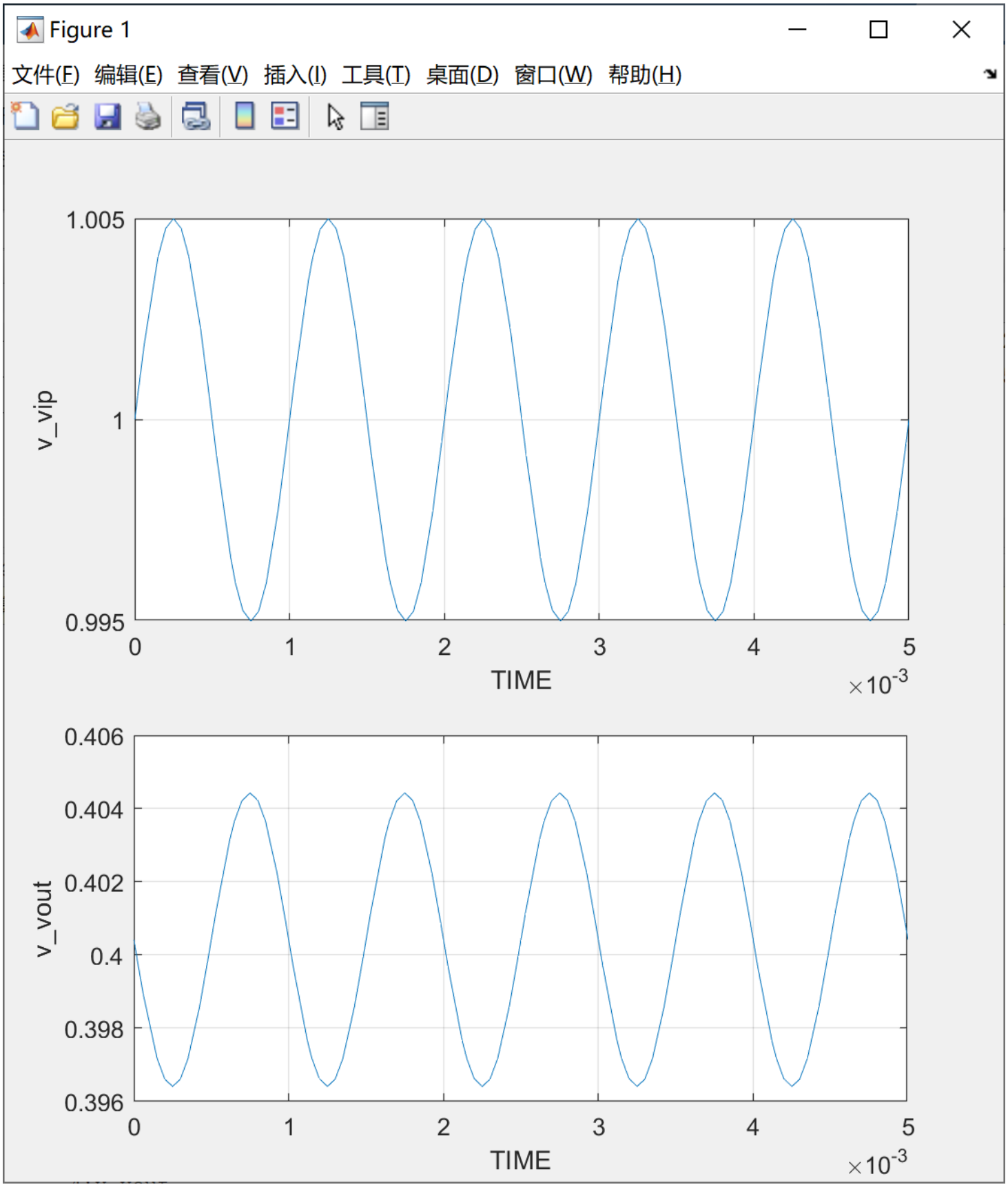


Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
1.005
1
0.995
v_vip
0
1
2
3
4
5
TIME
×10-3
0.406
0.404
0.402
0.4
0.398
0.396
v_vout
0
1
2
3
4
5
TIME
×10-3

(3)

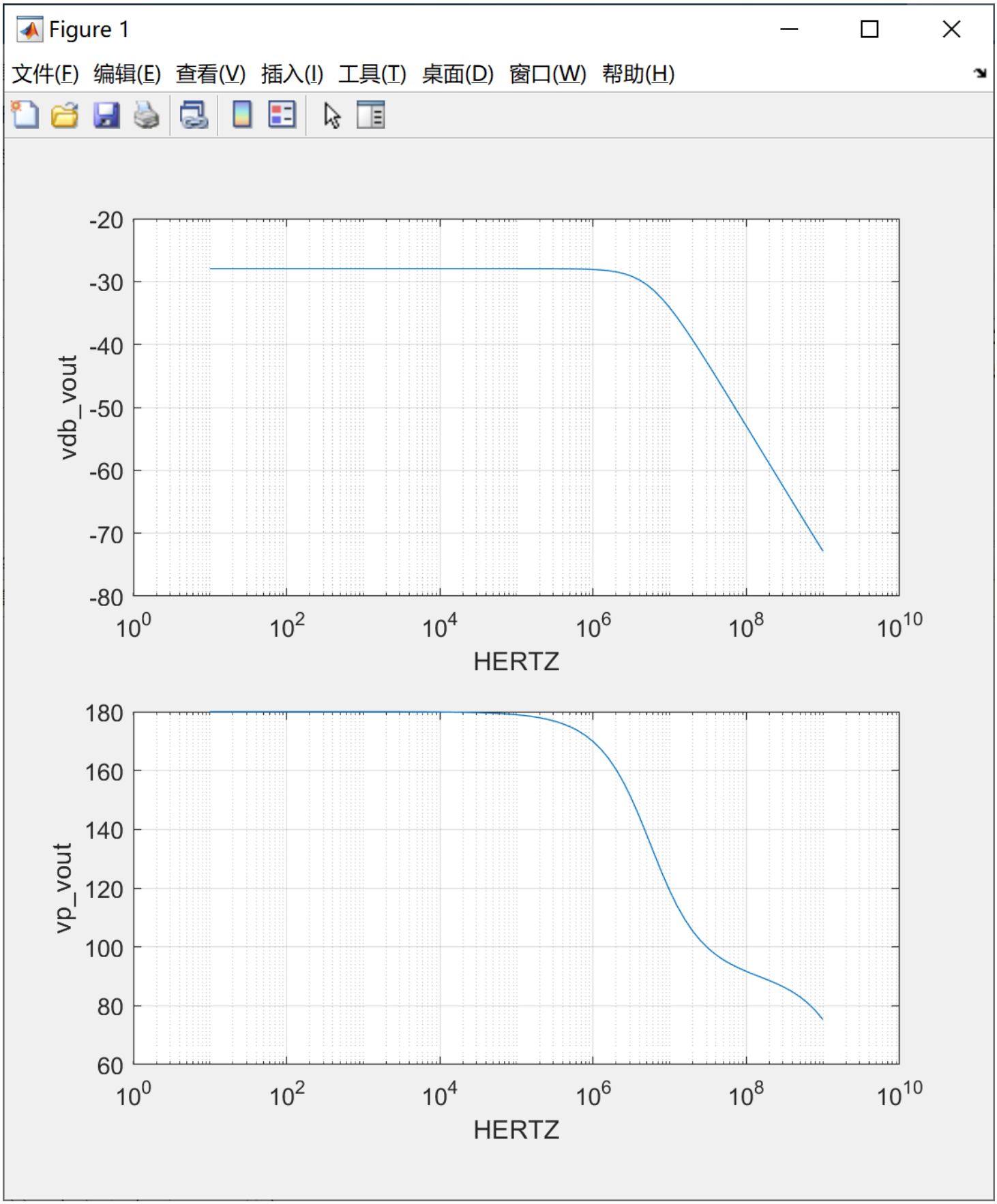


Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
vdb_vout
-20
-30
-40
-50
-60
-70
-80
10^0
10^2
10^4
10^6
10^8
10^{10}
HERTZ
vp_vout
180
160
140
120
100
80
60
10^0
10^2
10^4
10^6
10^8
10^{10}
HERTZ

6.21

电压并联负反馈