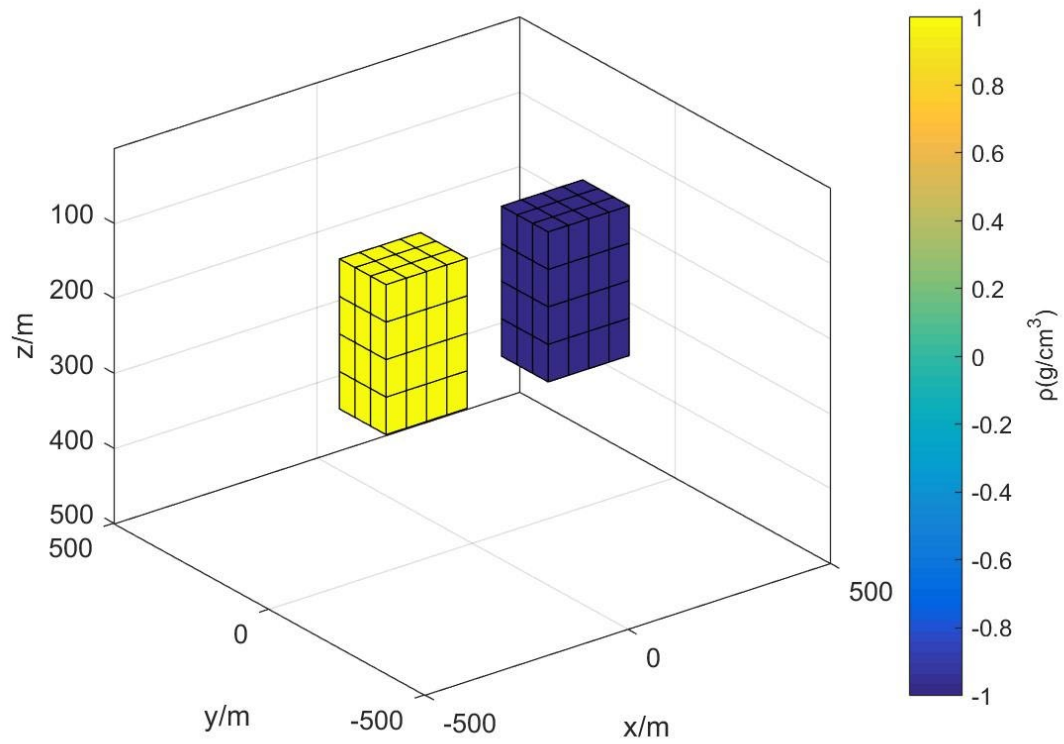
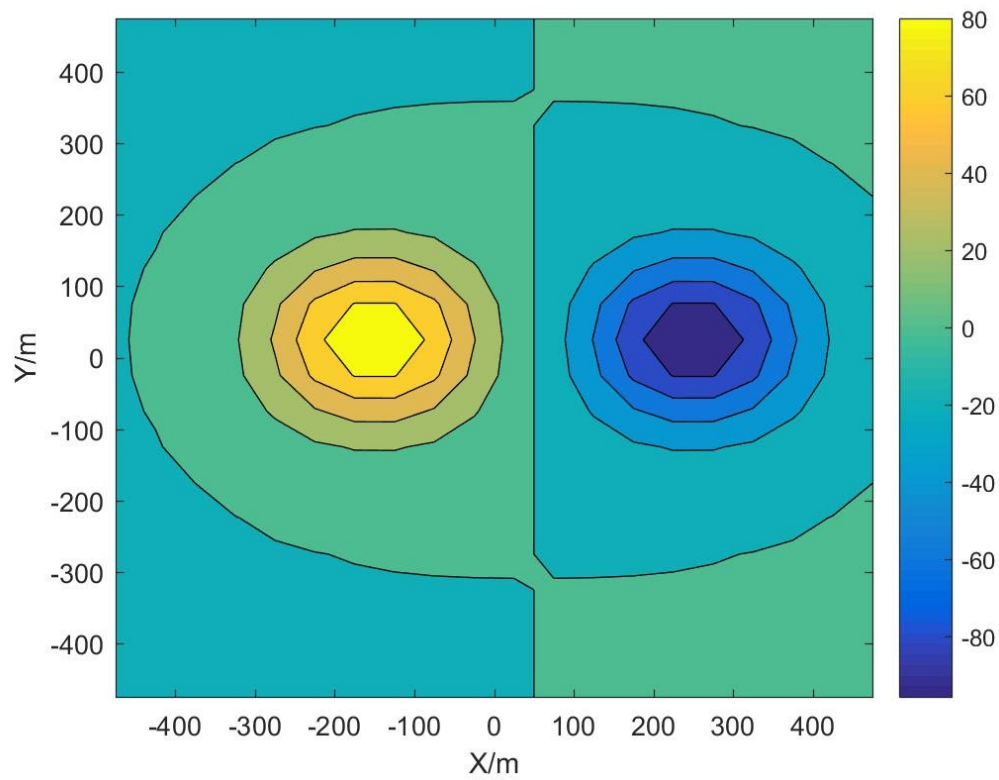


Synthetic model



Observed Gzz: observedgzz.grd



Step1:

Parameter setting and open file:

Click right-button of mouse inside the red line to open the observed gzz file:observedgzz.grd

The screenshot shows the DenInv3D software interface. The 'Parameter Setting' panel on the left includes fields for 'Maximum Iterations' (10), 'Convergence Precision' (1e-20), and dip angles α_s (280), α_x (1), α_y (1), and α_z (1). It also has checkboxes for 'Use Depth Weight', 'Use Roughness Matrix', and 'Use Initial Model'. The 'Regularization Parameter' section has radio buttons for 'Calculate Automatically' (selected) and 'Input'. The 'Inversion Preference' section has radio buttons for 'Gravity' and 'Gradient' (selected). The 'Gradient Component' section has checkboxes for Gxx, Gxy, Gxz, Gyy, Gyz, and Gzz (checked). A checkbox for 'Calculate Kernel Function' is also present.

The 'Modeling' panel on the right shows 'X-range(m)' from -500 to 500, 'Y-range(m)' from -500 to 500, and 'Z-range(m)' from 0.01 to 500. It includes an 'Observed Surface(m)' field set to 0 and a checked 'Equivalent Space Model' option.

Below the modeling panel is a table with 5 columns: 'Grid Cell Number in X-direction', 'Grid Cell Number in Y-direction', 'Bottom Depth in Z-direction(m)', 'Depth Weight Z0(m)', and an unlabeled column. The table contains 10 rows of data.

Grid Cell Number in X-direction	Grid Cell Number in Y-direction	Bottom Depth in Z-direction(m)	Depth Weight Z0(m)	
1	20	20	50	0
2	20	20	100	0
3	20	20	150	35
4	20	20	200	40
5	20	20	250	50
6	20	20	300	0
7	20	20	350	0
8	20	20	400	0
9	20	20	450	0
10	20	20	500	0

At the bottom left, the 'Opening Files List' panel shows a list of files. The 'Gradient Gzz' file is selected, and its path 'D:\mode3\observedgzz.grd' is shown in the 'Files Name' field. A red rectangle highlights this area, and a blue 'Open file' button is visible.

Buttons for 'Add Layer', 'Delete Layer', 'Calculate', and 'Exit' are located at the bottom right of the interface.

Step2:

Input the modeling parameters or load model data from file, click right-button of mouse to open a model file in the red line area.

Load model data:model.txt

DenInv3D
File(F) Draw(D) Help(H)

Parameter Setting

Maximum Iterations: 10
Convergence Precision: 1e-20

as: 280
ax: 1
ay: 1
az: 1

Parameter Preferences

☒ Use Depth Weight
☒ Use Roughness Matrix
☐ Use Initial Model

Regularization Parameter

☒ Calculate Automatically
☐ Input

Inversion Preference

☐ Gravity
☒ Gradient

Gradient Component

☐ Gxx
☐ Gxy
☐ Gxz
☐ Gyy
☐ Gyz
☒ Gzz

☒ Calculate Kernel Function

Opening Files List

Files Name

Gravity
Gradient Gxx
Gradient Gxy
Gradient Gxz
Gradient Gyy
Gradient Gyz
Gradient Gzz
Initial Model

D:\mode3\observedgzz.grd

Modeling

Minimum
Maximum

X-range(m): -500 500
Y-range(m): -500 500
Z-range(m): 0.01 500

Observed Surface(m): 0
☒ Equivalent Space Model

Grid Cell Number	Grid Cell Number	Bottom Depth	Depth Weight	
in X-direction	in Y-direction	in Z-direction(m)	Z0(m)	
1	20	20	50	0
2	20	20	100	0
3	20	20	150	35
4	20	20	200	40
5	20	20	250	50
6	20	20	300	0
7	20	20	350	0
8	20	20	400	0
9	20	20	450	0
10	20	20	500	0

Load model data
Save model data

Add Layer
Delete Layer

Calculate
Exit

Step 3:

Click the button “calculate” to run

DenInv3D
File(F) Draw(D) Help(H)

Parameter Setting

Maximum Iterations: 10
Convergence Precision: 1e-20

as: 280
ax: 1
ay: 1
az: 1

Parameter Preferences

☒ Use Depth Weight
☒ Use Roughness Matrix
☐ Use Initial Model

Regularization Parameter

☒ Calculate Automatically
☐ Input

Inversion Preference

☐ Gravity
☒ Gradient

Gradient Component

☐ Gxx
☐ Gxy
☐ Gxz
☐ Gyy
☐ Gyz
☒ Gzz

☒ Calculate Kernel Function

Opening Files List

Files Name

Gravity
Gradient Gxx
Gradient Gxy
Gradient Gxz
Gradient Gyy
Gradient Gyz
Gradient Gzz
Initial Model

D:\mode3\observedgzz.grd

Modeling

Minimum
Maximum

X-range(m): -500 500
Y-range(m): -500 500
Z-range(m): 0.01 500

Observed Surface(m): 0
☒ Equivalent Space Model

Grid Cell Number	Grid Cell Number	Bottom Depth	Depth Weight	
in X-direction	in Y-direction	in Z-direction(m)	Z0(m)	
1	20	20	50	0
2	20	20	100	0
3	20	20	150	35
4	20	20	200	40
5	20	20	250	50
6	20	20	300	0
7	20	20	350	0
8	20	20	400	0
9	20	20	450	0
10	20	20	500	0

Add Layer
Delete Layer

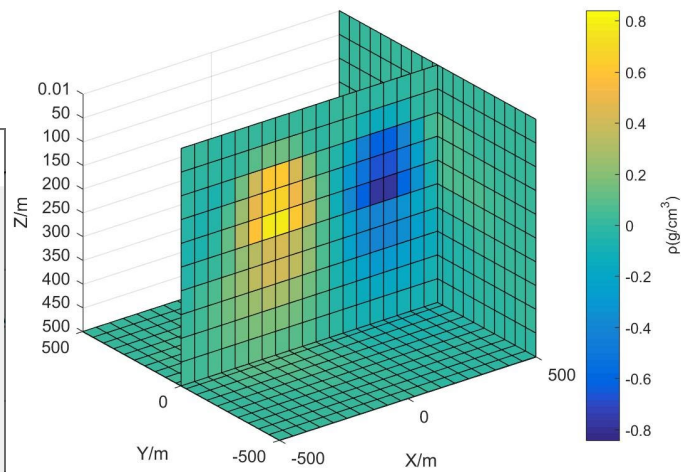
Calculate
Exit

coordinate of slice in X-direction:
500

coordinate of slice in Y-direction:
0

coordinate of slice in Z-direction:
500

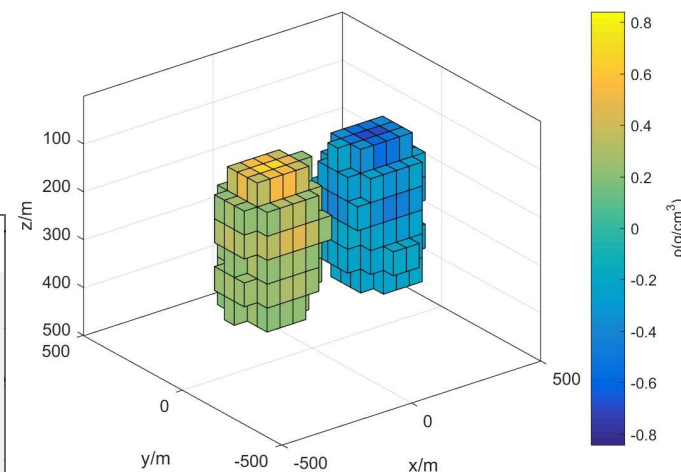
OK Cancel



Density 1:
-0.2

Density 2:
0.2

OK Cancel



If Density 1 < Density 2:

$\rho < \text{Density 1}$, or $\rho > \text{Density 2}$ will be shown.

If Density 1 > Density 2:

ρ between Density 1 and Density 2 will be shown.

observedgzz.grd: observed gzz which was calculated from the synthetic model, the Golden Software Surfer GRD ascii format.

model.txt: the modeling file.

Inversiondensity.dat: inversion result.

4 columns: x,y,z,rho

Inirho.dat: the synthetic model

Inirho0.dat: the fourth column of inirho.dat, an example of initial model to show the data format, if you want to use the initial model.

How to input the modeling data?

According to the observedgzz.grd, we have:

$X_{min}=-475$ m, $X_{max}=475$ m, $N_x=20$, $dx=(X_{max}-X_{min})/(N_x-1)=50$ m

$Y_{min}=-475$ m, $Y_{max}=475$ m, $N_y=20$, $dy=(Y_{max}-Y_{min})/(N_y-1)=50$ m

Model:

$X_{minm}=X_{min}-dx/2=-475-50/2=-500$

$X_{maxm}=X_{max}+dx/2=475+50/2=500$

$Y_{minm}=Y_{min}-dy/2=-475-50/2=-500$

$Y_{maxm}=Y_{max}+dy/2=475+50/2=500$

$N_{xm}=20$, $N_{ym}=20$

$dxm=(X_{maxm}-X_{minm})/N_{xm}=50$

$dym=(Y_{maxm}-Y_{minm})/N_{ym}=50$

For the first observed point: $(x,y)=(-475,-475)$

The center of the first prism model: $(x_m,y_m)=(-475,-475)$

It means that the center of prism model corresponding to the observed point.

The coordinate of the inversion density is the center of the prism model.