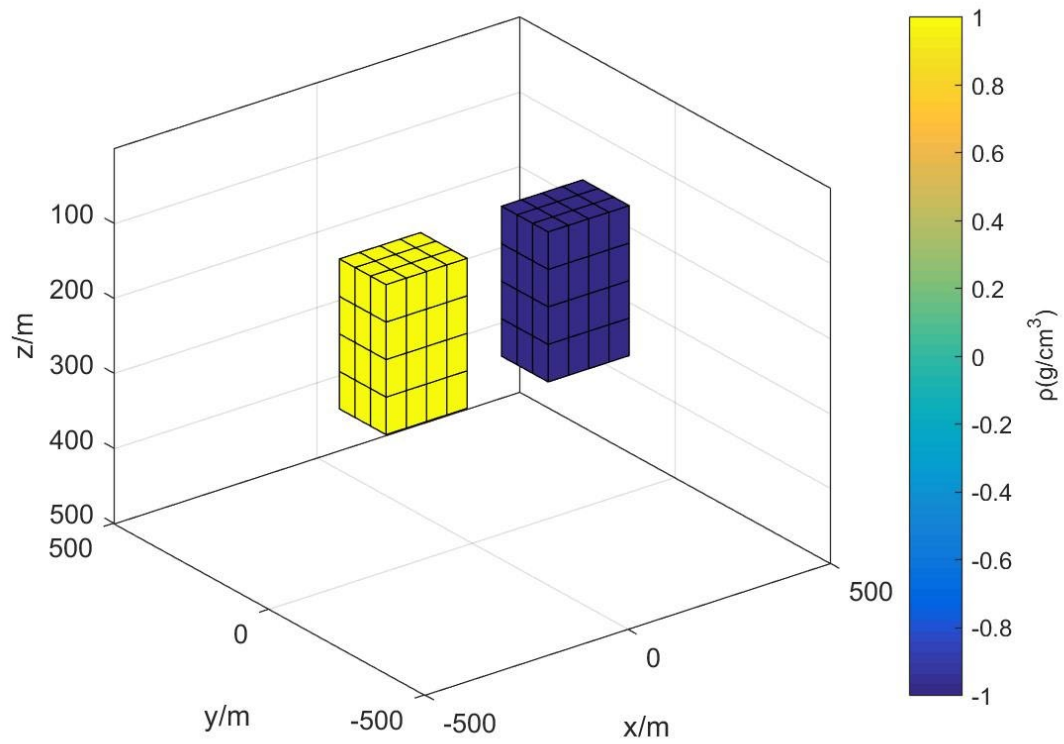
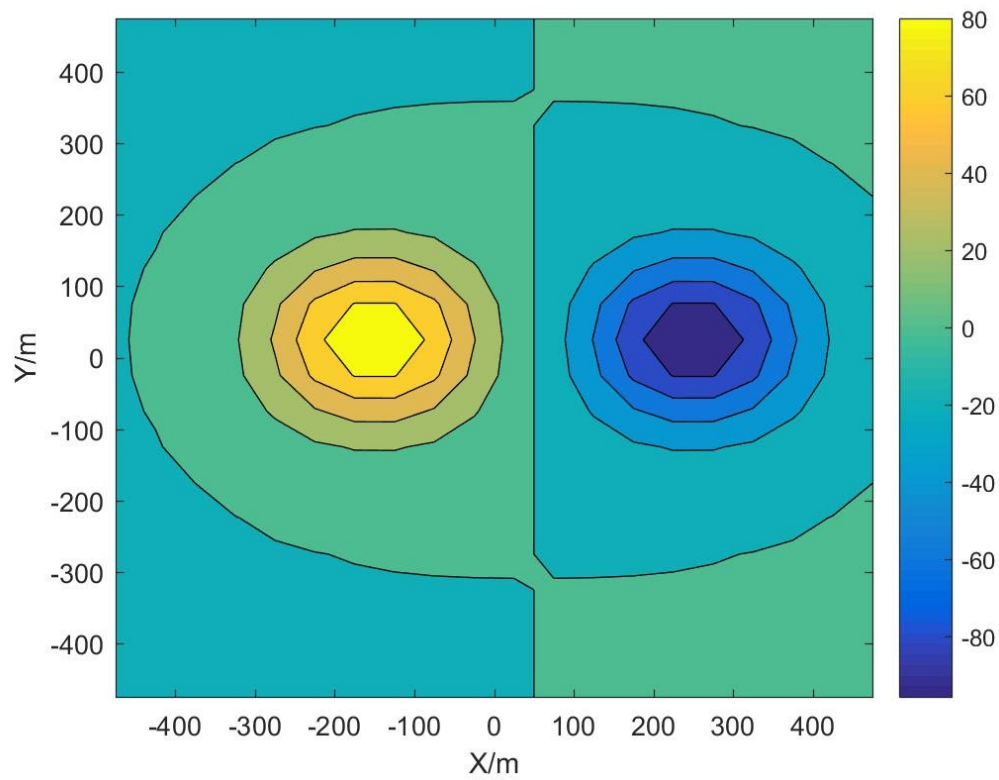


Synthetic model



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) and 'Convergence Precision' (1e-20). Below these are sliders for α_s (280), α_x (1), α_y (1), and α_z (1). The 'Parameter Preferences' section has checkboxes for 'Use Depth Weight' (checked), 'Use Roughness Matrix' (checked), and 'Use Initial Model' (unchecked). The 'Regularization Parameter' section has radio buttons for 'Calculate Automatically' (selected) and 'Input'. The 'Inversion Preference' section has radio buttons for 'Gravity' (unchecked) 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 also includes 'Observed Surface(m)' (0) and a checked 'Equivalent Space Model' option.

At the bottom left, the 'Opening Files List' panel is highlighted with a red border. It contains a list of file types: Gravity, Gradient Gxx, Gradient Gxy, Gradient Gxz, Gradient Gyy, Gradient Gyz, Gradient Gzz, and Initial Model. The 'Gradient Gzz' option is selected, and the file path 'D:\mode3\observedgzz.grd' is entered in the 'Files Name' field. An 'Open file' button is next to the path.

The bottom right of the interface features buttons for 'Add Layer', 'Delete Layer', 'Calculate', and 'Exit'.

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
2	20	20	100
3	20	20	150
4	20	20	200
5	20	20	250
6	20	20	300
7	20	20	350
8	20	20	400
9	20	20	450
10	20	20	500

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	D:\mode3\observedgzz.grd
Initial Model	

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

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	D:\mode3\observedgzz.grd
Initial Model	

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

Add Layer
Delete Layer

Calculate
Exit

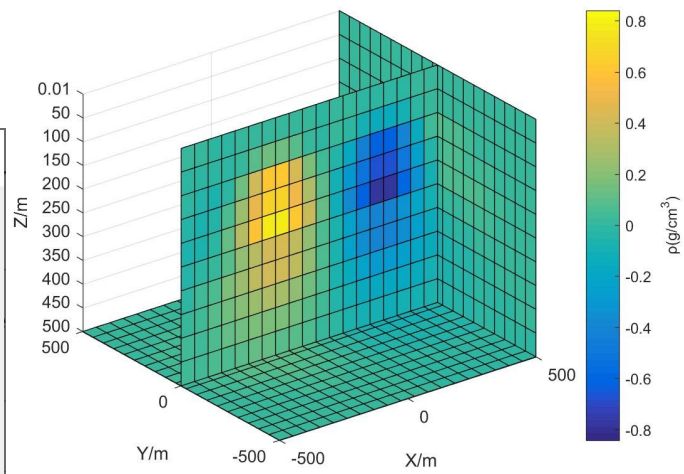
I... — □ ×

coordinate of slice in X-direction:
500

coordinate of slice in Y-direction:
0

coordinate of slice in Z-direction:
500

OK Cancel

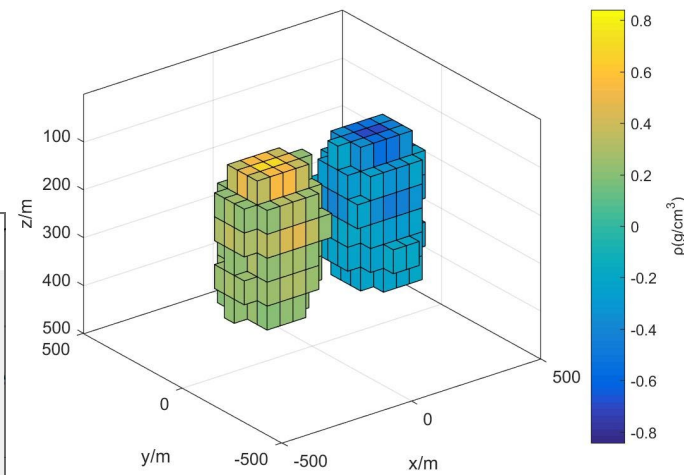


I... — □ ×

Density 1:
-0.2

Density 2:
0.2

OK Cancel



observedgzz.grd: the observed data, the Golden Software Surfer GRD ascii format.

model.txt: the modeling file.

Inversiondensity.dat: inversion result.

4 columns: x,y,z,rho

Inirho_inputfile.dat: the initial density for inversion

Inirho_originalfile.dat: to show the data order of inirho_inputfile.dat.

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.