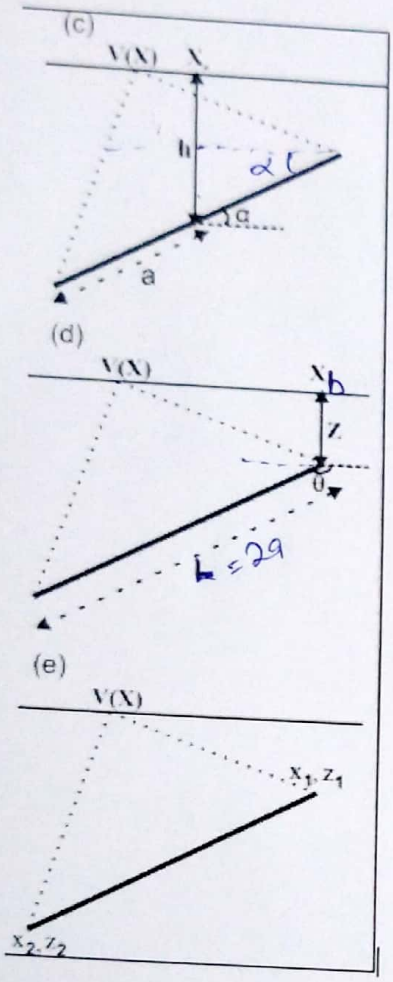
GS543 Tutorial-3

Forward Modeling of 2D Inclined Sheet Type Body

An inclined sheet-type structure (Figure 2.1c) in two dimensions can be described by a set of five model parameters, namely, electric dipole density $k = I\rho/2\pi$ (I is the current density of the medium and ρ is the resistivity of the sheet), x coordinate of the center of the sheet x_0, depth of the center of the sheet h, half-width of the sheet a and inclination angle α.



The general equation of SP anomaly $V(x)$ at any point P on a profile perpendicular to the strike of a 2-D inclined sheet (Murthy and Haricharan, 1985; Sundararajan et al., 1998) is written as:

$$V(x) = k \ln\left[\frac{\{(x-x_0)-a\cos\alpha\}^2+(h-a\sin\alpha)^2}{\{(x-x_0)+a\cos\alpha\}^2+(h+a\sin\alpha)^2}\right]. \qquad (2.1.2)$$

The SP anomaly $V(x)$ along a profile above a sheet-like body (Figure 2.1d) can also be given by the equation (Edge and Laby, 1931).

$$V(x) = k\ln\left[\frac{(x-x_b)^2+z^2}{\{x-(x_b+L\cos\theta)\}^2+(z+L\sin\theta)^2}\right] \qquad (2.1.3)$$

In the above equation k is the same as in equation (2.1.2), x_b and z define the location of the upper edge of the sheet. L is the extent of the sheet; θ is the angle of the sheet in clockwise direction from positive x-axis. → $\theta = 225°$ $135°$, $L = 29$

$X_b = 100$, $Z = 10$,

The SP anomaly $V(x)$ of a sheet-like body (Figure2.1e) can also be given by the equation.

$$V(x) = k\ln\left[\frac{(x-x_1)^2+z_1^2}{(x-x_2)^2+z_2^2}\right] \qquad (2.1.4)$$

start stop stop

$X = -500 : 10 : 500$

$\alpha = 90$, $h = 30$, $q = 10$

$\alpha = 45°$, $X_1 = 100$, $Z_1 = 10$

$X_0 = 0$, $X_2 = -10$, $Z_2 = 40$

at $\alpha = 90°$

$X_0 = 0$, $V = 55$

-500.0

Write down a Fortran program to compute the SP response using the equations. Create a new file "Yourname.txt" and save all the data in four columns.

Choose the input value according to your choice similar like tutorial-1

Example: anand.txt

x	v(2.1.2)	v(2.1.3)	v(2.1.4)
10	-2	-1.8	-2
20	-5.8	-2.7	-5.8
30	-10.3	-1.5	-10.3
40	-6.5	-1.8	-6.5
50	-9.1	-2.6	-9.1
60	-16.5	-2.8	-16.5
70	-14.1	-1.8	-14.1
80	-8.3	-2.4	-8.3
90	-8.1	-1.8	-8.1
100	-9.8	-1.9	-9.8
110	-7.9	-2.3	-7.9
120	-1.7	-1.7	-1.7
130	-12.4	-2.6	-12.4
140	-7.7	-2.3	-7.7