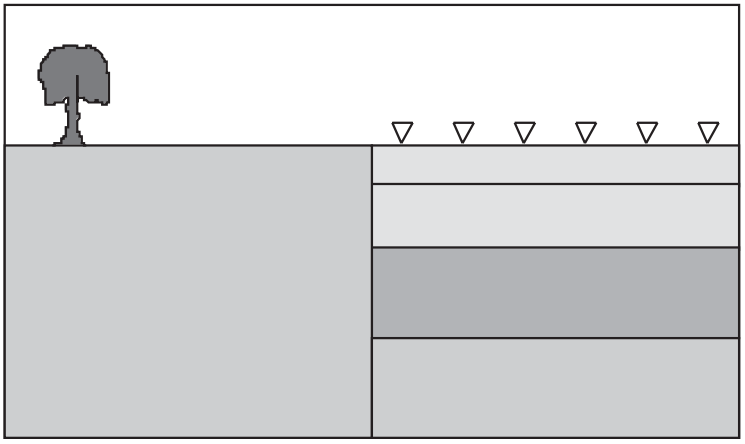
Computer Assignment – Part 2

Iterative, linearized solution of a nonlinear inverse problem



Using the same data as in Computer Assignment 1, we wish to estimate $\Delta\rho(z)$ from observations of the horizontal gravity gradient along the x-axis. In this assignment we represent the subsurface to the right of the fault by only 5 horizontal layers. This time, not only the mass density contrasts, but also the thicknesses of the layers are unknown. The subsurface to the left of the fault has a mass density of 2600 kg/m^3, and the 5 layers are resting on an infinite quarter space also of density 2600 kg/m^3.

- Solve the problem using iterative, linearized inversion (Menke, page 152). Use a starting model with 5 layers, approximating as well as possible the solution found in Assignment 1. Instead of Menke's Equation (9.14), use

$$\mathbf{m}_{n+1}^{est} = \mathbf{m}_{n}^{est} + \alpha\Delta\mathbf{m}_{n+1} \tag{1}$$

  where $0 < \alpha \leq 1$. Experiment with α and observe its effect on the convergence properties of your algorithm.