TEST PROFILES FOR SYNTHETIC DATA SETS

1. Electrical conductivity inversion

Model function for the electrical conductivity as a function of depth:

$$\textbf{Gaussian} \quad \sigma(z) = \mathrm{e}^{-(z-1.2)^2},$$

$$\textbf{Triangular} \quad \sigma(z) = \begin{cases} \frac{8z+1}{5} & \text{if} \quad z \leq 0.5 \\ \frac{6-2z}{5} & \text{if} \quad z > 0.5, \end{cases}$$

$$\textbf{Step} \quad \sigma(z) = \begin{cases} 0.2 & \text{if} \quad z \leq 0.5 \\ 1 & \text{if} \quad 0.5 < z < 1.5 \\ 0.2 & \text{if} \quad z \geq 1.5. \end{cases}$$

where z represents the depth in meters.

Model function for the fixed magnetic permeability as a function of depth:

$$\textbf{Constant} \quad \mu(z) = \mu_r,$$

$$\textbf{Step} \quad \mu(z) = \begin{cases} 1 & \text{if} \quad z \leq a \\ \mu_r & \text{if} \quad a < z < b \\ 1 & \text{if} \quad z \geq b, \end{cases}$$

where a, b and μ_r are parameters to be chosen by the user, with μ_r being the relative permeability given by $\mu_r = \mu/\mu_0$.

2. Magnetic permeability inversion

Model function for the magnetic permeability as a function of depth:

$$\textbf{Gaussian} \quad \mu_\theta(z) = \mu_0(\theta \mathrm{e}^{-(z-1.2)^2} + m),$$

where θ and m are parameters to be chosen by the user.

Model function for the fixed electrical conductivity as a function of depth:

$$\textbf{Gaussian} \quad \sigma(z) = \theta \mathrm{e}^{-(z-1.2)^2},$$

$$\textbf{Triangular} \quad \sigma(z) = \begin{cases} \frac{8z+1}{5} & \text{if} \quad z \leq 0.5 \\ \frac{6-2z}{5} & \text{if} \quad z > 0.5, \end{cases}$$

$$\textbf{Step} \quad \sigma(z) = \begin{cases} 0.2 & \text{if} \quad z \leq 0.5 \\ 1 & \text{if} \quad 0.5 < z < 1.5 \\ 0.2 & \text{if} \quad z \geq 1.5. \end{cases}$$