Individual Sections of the Book

Inverse Problems: Exercices

With mathematica, matlab, and scilab solutions

Albert Tarantola
Université de Paris, Institut de Physique du Globe
4, place Jussieu; 75005 Paris; France
E-mail: albert.tarantola@ipgp.jussieu.fr

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1.8 Distance Between Two Electric Wires

1.8.1 Question
We need a sample whose electric resistivity is as close as possible to a “standard resistivity” \( \rho = 100 \, \Omega \, \text{m} \). Unfortunately, we only have one sample whose resistivity is \( \rho_1 = 10 \, \Omega \, \text{m} \), and one sample whose resistivity is \( \rho_2 = 200 \, \Omega \, \text{m} \). Which sample should we choose? Please comment briefly.

1.8.2 Answer
Electric resistivity is a Jeffreys parameter, so the distance between two values should be measured logarithmically. The first distance is

\[
D_1 = \log \frac{100 \, \Omega \, \text{m}}{10 \, \Omega \, \text{m}} = \log 10 ,
\]

while the second distance is

\[
D_2 = \log \frac{200 \, \Omega \, \text{m}}{100 \, \Omega \, \text{m}} = \log 2 .
\]

Second distance is smaller, so we should choose the second sample.