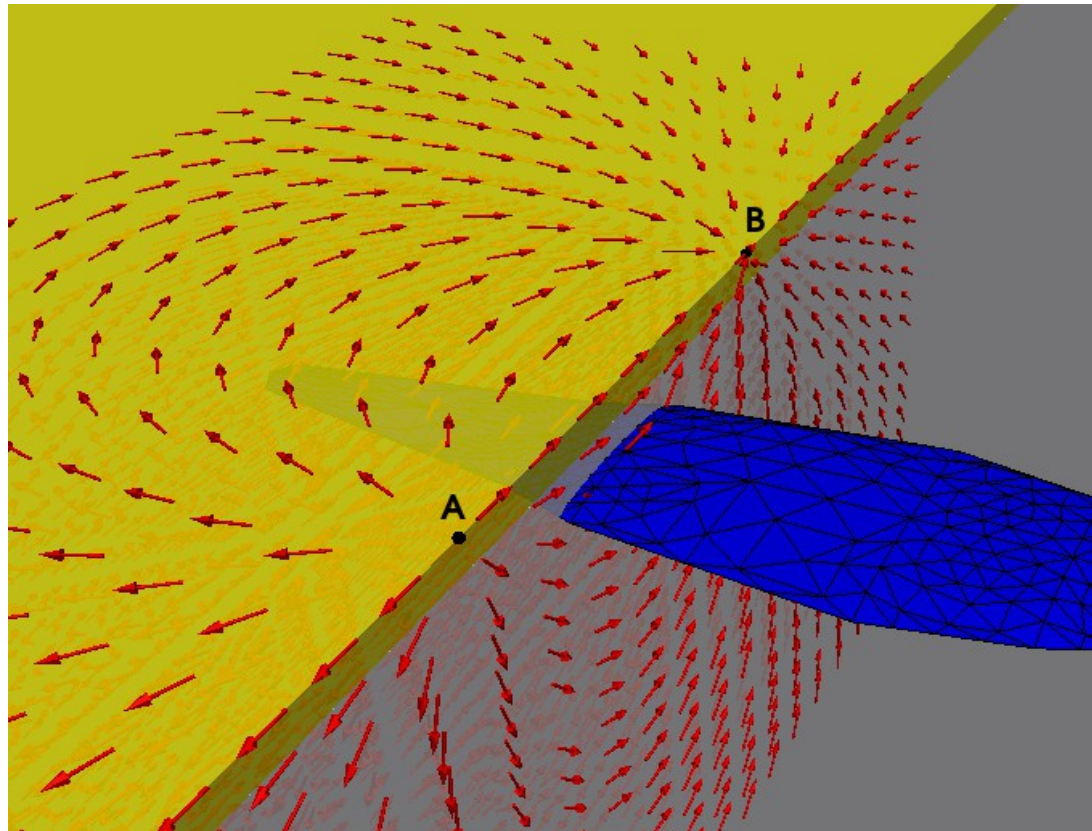
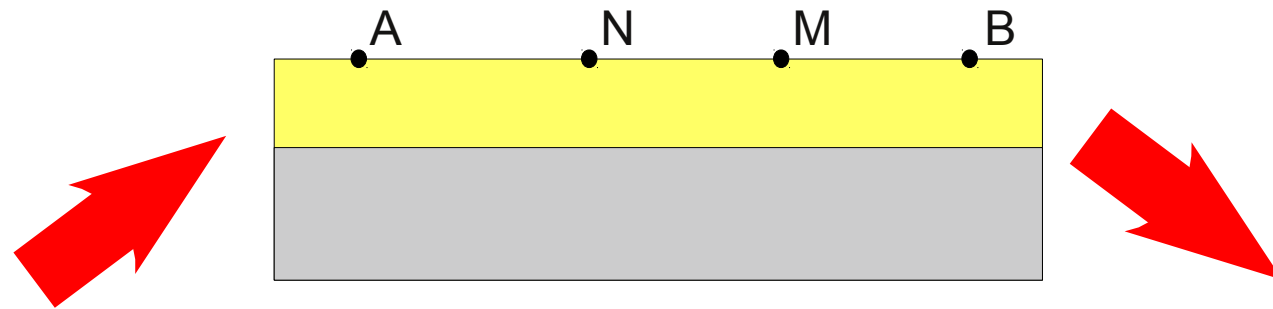


VESStudy

Software for 3D simulation of vertical electric sounding study (VES).
(forward problem solution)



Vertical Electric Sounding (VES).



Measurements along the survey line with several **A B** distances for each point of study.

Voltage between the electrodes **N** and **M**.



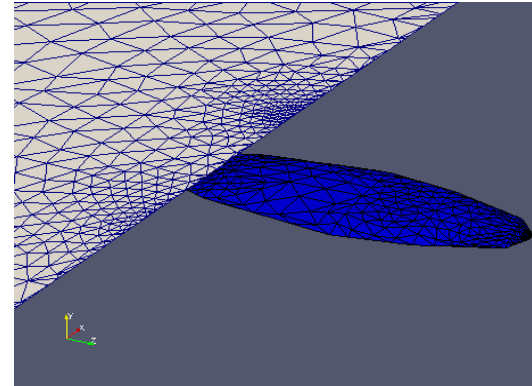
Values of the apparent resistivity.



Geoelectric section

Simulation

Definition of 3D structure by interfaces,
separating rocks.



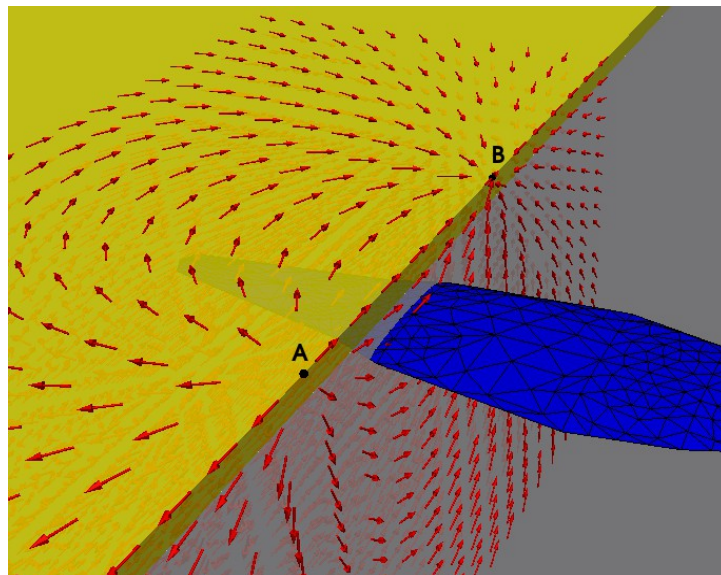
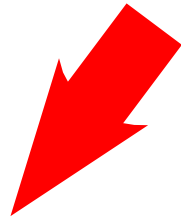
VESStudy

Measurement description: probe
location, a current, rocks resistivity.

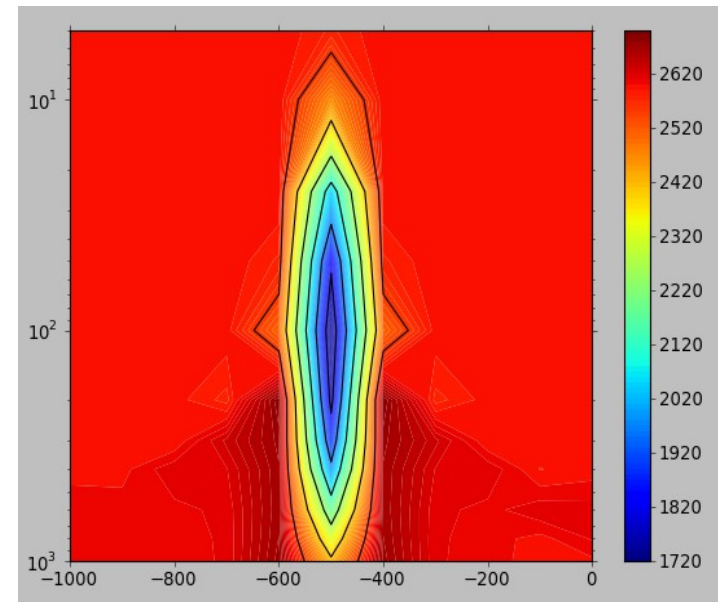
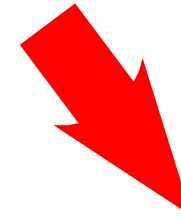
Voltage between the electrodes M N.
Values of the apparent resistivity.

Calculation results.

Voltage between the electrodes M N.
Values of the apparent resistivity.



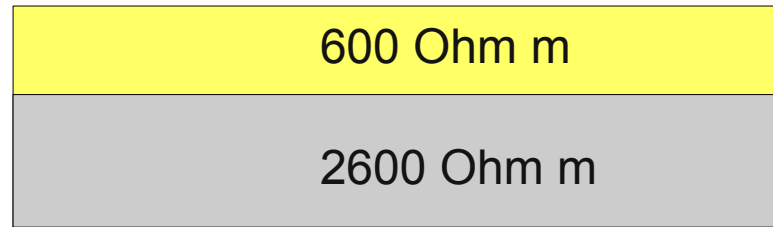
3D visualization



Section of the apparent resistivity

Example 1

Two layer medium

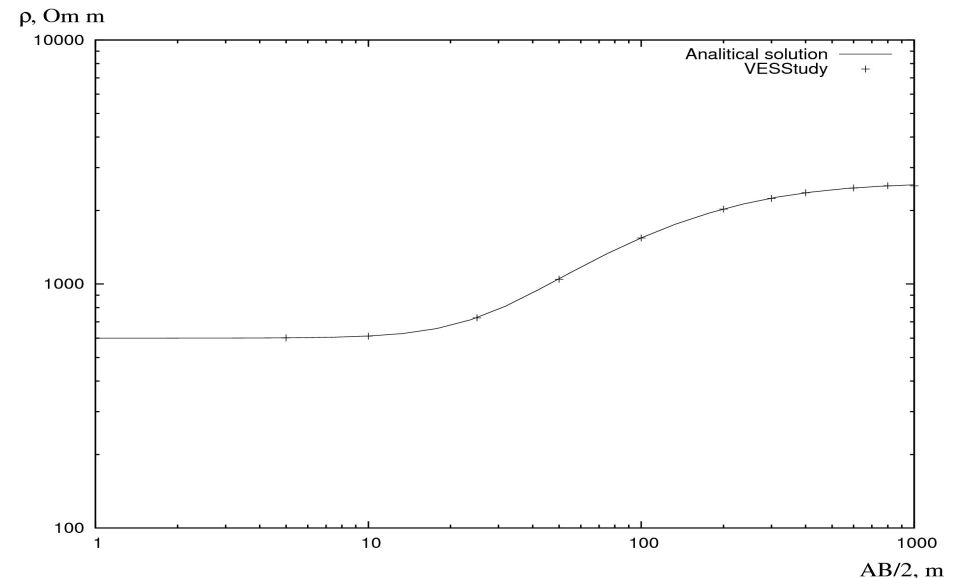


Analytical solution

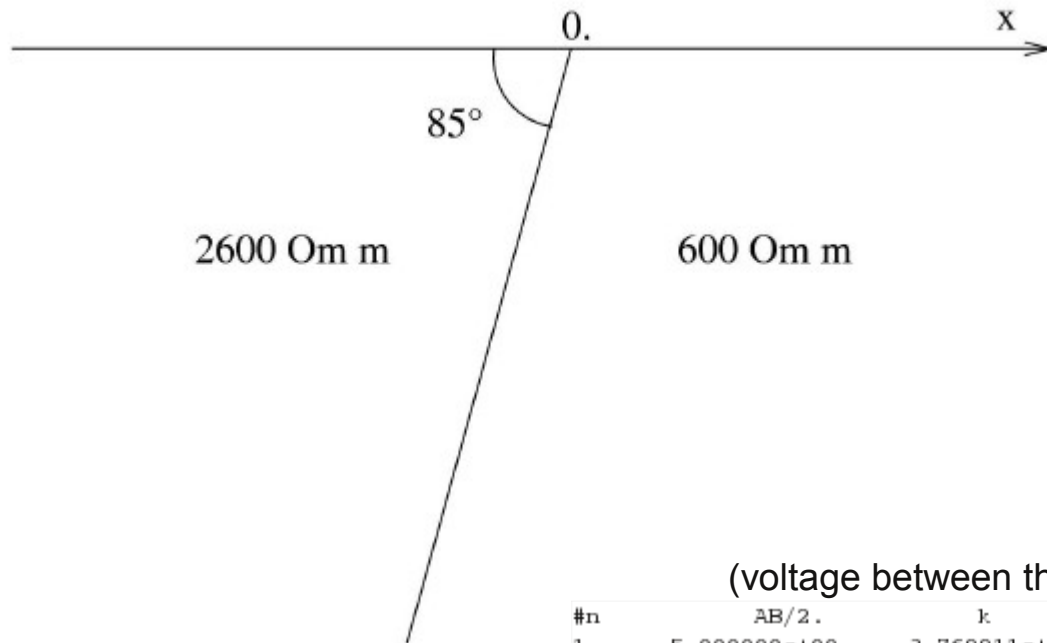
$$\rho_k \left(\frac{AB}{2} \right) = \rho_0 \left[1 + 2 \sum_{n=1}^{\infty} \frac{k_{12}^n \left(\frac{AB}{2h_1} \right)^3}{\left[\left(\frac{AB}{2h_1} \right)^2 + 4n^2 \right]^{3/2}} \right]$$



VESStudy



Example 2



Probes description

-5.0	0.	5.0	0.	-1.0	0.	1.0	0.	1.0	2600.	600.
-10.0	0.	10.0	0.	-3.0	0.	3.0	0.	1.0	2600.	600.
-25.0	0.	25.0	0.	-5.0	0.	5.0	0.	1.0	2600.	600.
-50.0	0.	50.0	0.	-10.0	0.	10.0	0.	1.0	2600.	600.
-100.0	0.	100.0	0.	-30.0	0.	30.0	0.	1.0	2600.	600.
-200.0	0.	200.0	0.	-40.0	0.	40.0	0.	1.0	2600.	600.
-300.0	0.	300.0	0.	-100.0	0.	100.0	0.	1.0	2600.	600.
-400.0	0.	400.0	0.	-100.0	0.	100.0	0.	1.0	2600.	600.
-600.0	0.	600.0	0.	-200.0	0.	200.0	0.	1.0	2600.	600.
-800.0	0.	800.0	0.	-200.0	0.	200.0	0.	1.0	2600.	600.
-1000.0	0.	1000.0	0.	-300.0	0.	300.0	0.	1.0	2600.	600.

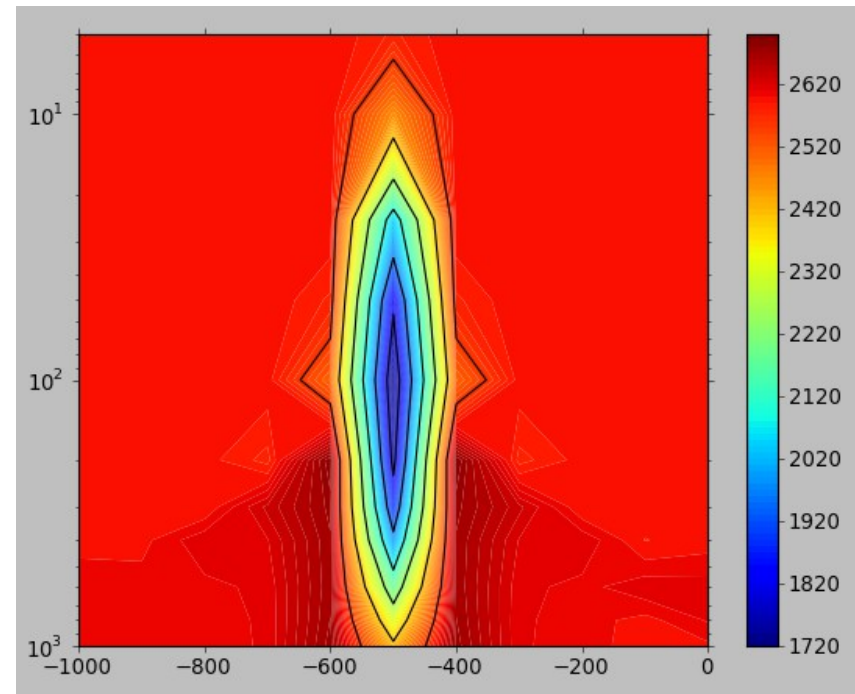
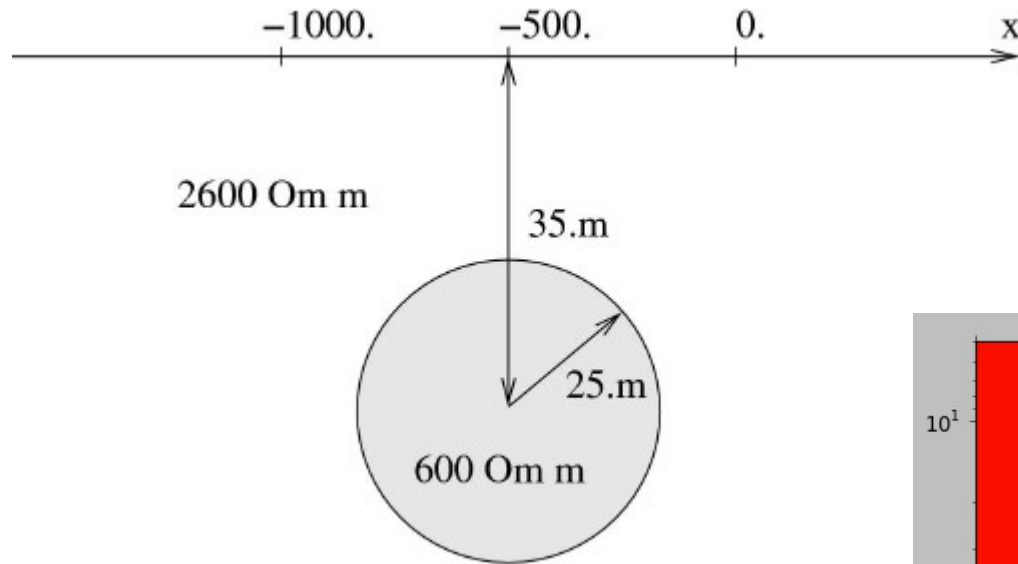


Calculation result

(voltage between the electrodes M N, the apparent resistivity)

#n	AB/2.	k	I	V	rhok
1	5.000000e+00	3.769911e+01	1.000000e+00	4.244137e+01	1.600002e+03
2	1.000000e+01	4.764749e+01	1.000000e+00	3.358009e+01	1.600007e+03
3	2.500000e+01	1.884956e+02	1.000000e+00	8.488504e+00	1.600045e+03
4	5.000000e+01	3.769911e+02	1.000000e+00	4.244595e+00	1.600175e+03
5	1.000000e+02	4.764749e+02	1.000000e+00	3.359286e+00	1.600615e+03
6	2.000000e+02	1.507964e+03	1.000000e+00	1.062501e+00	1.602214e+03
7	3.000000e+02	1.256637e+03	1.000000e+00	1.276301e+00	1.603847e+03
8	4.000000e+02	2.356194e+03	1.000000e+00	6.815431e-01	1.605848e+03
9	6.000000e+02	2.513274e+03	1.000000e+00	6.393876e-01	1.606956e+03
10	8.000000e+02	4.712389e+03	1.000000e+00	3.403109e-01	1.603677e+03
11	1.000000e+03	4.764749e+03	1.000000e+00	3.341815e-01	1.592291e+03

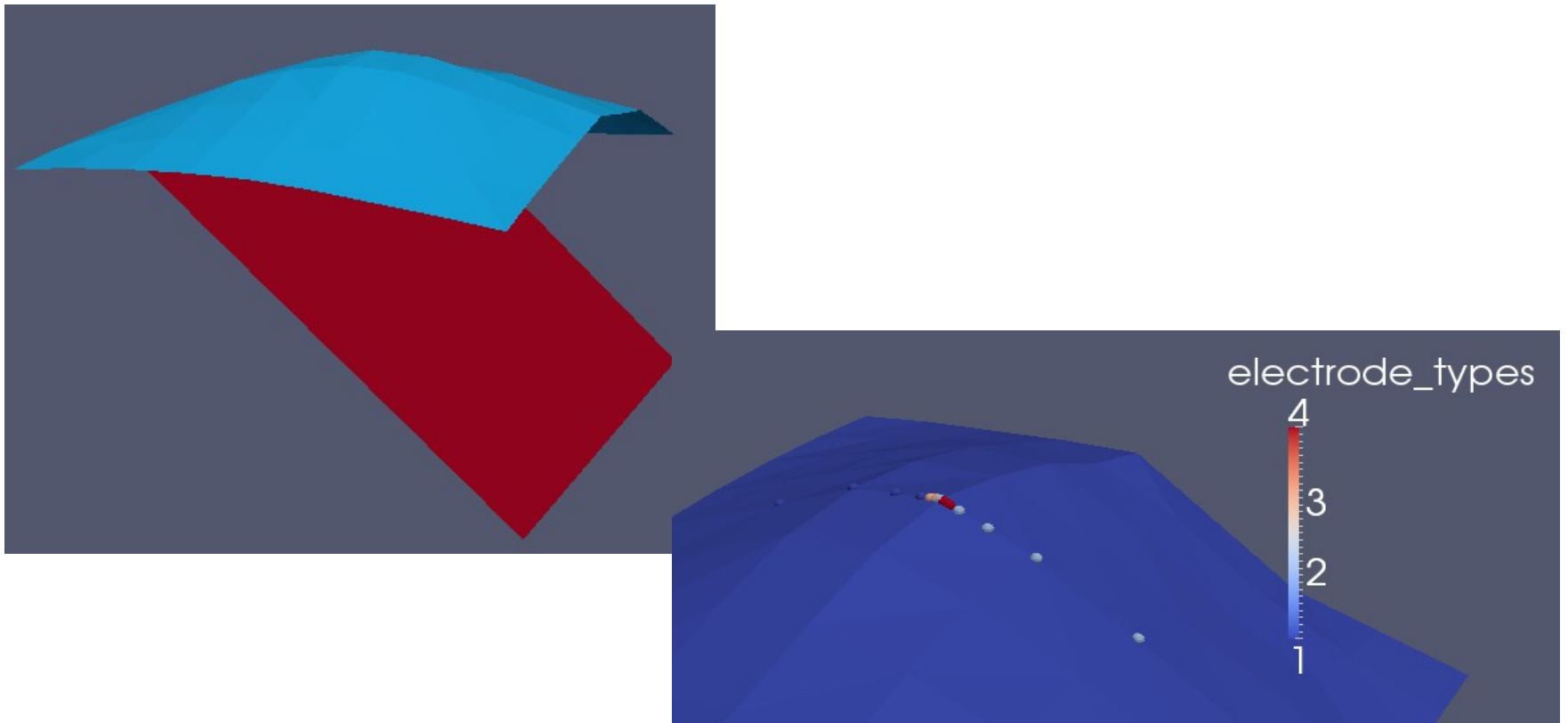
Example 3



Section of the apparent resistivity

Example 4

Creation of models with arbitrary relief geometry



1 - electrodes A, 2 - electrodes B, 3 - electrodes M, 4 - electrodes N

Application of VESStudy

- Choice of VES electrode array and development of measurement technique.
- Feasibility study for VES application to investigation of geological structures.
- Solution of the inverse problem.
- Testing of software/methods for solution of the inverse problem.
- For electrical resistivity tomography the calculations can be used for optimization of electrode positions, number of electrodes and measurement program.