Determination of the error of solving the inverse problem of electrometry of oil and gas wells

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The work solves the most modern problems of geophysical research of oil and gas wells.

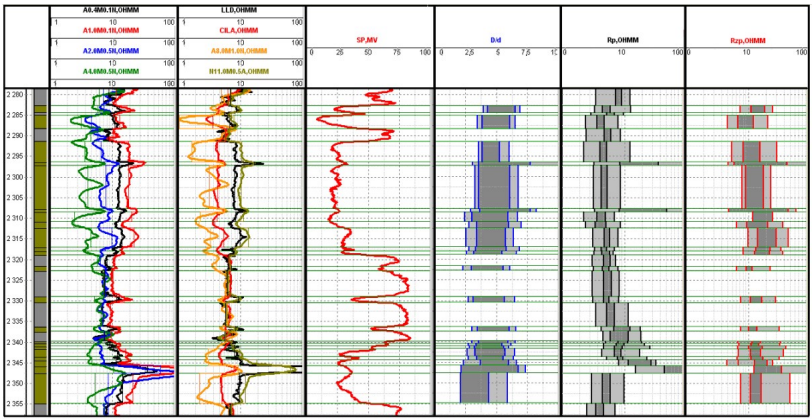
1. Finding the quantitative relationship between the measurement error and the error of solving the inverse problem.

2. Effective use of additional information to determine reservoirs. Since the initial data are not points but intervals of permissible values, it was concluded that the result of solving the inverse problem should also be represented by an interval of permissible values. Figure 1 shows such examples. (notation in the pictures: Well resistivity 0.7 Ohm·m; LLD – lateral logging BK-3; CILA - AIK5 induction logging resistivity; SP is the spontaneous polarization potential curve; ρ_P, ρ_{ZP} - resistivity of the formation and the zone of penetration; D/d - the ratio of the diameter of the penetration zone to the nominal diameter of the well; OHMM - Ohm·m designation on the tablet.
– valid parameter values obtained by the proposed method;
– valid parameter values obtained by the "classical" method;
– reservoir attribute designation in the reservoir properties column.)

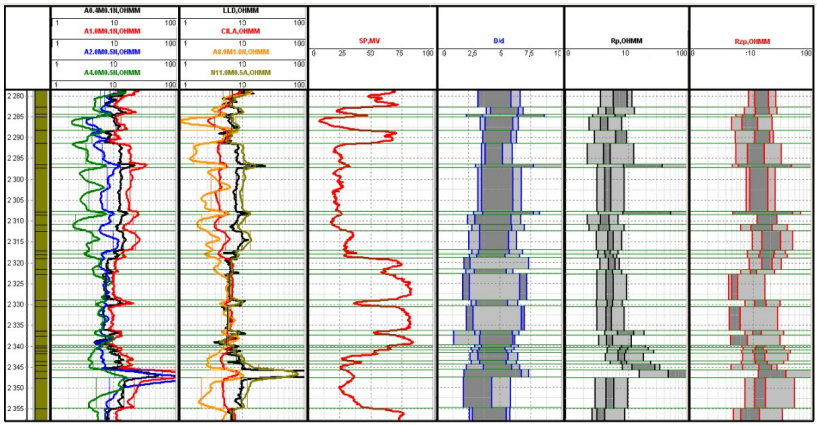
Figure 1.a shows the result of solving the inverse problem without additional information, Figure 2.b shows the result of solving the inverse problem with additional information.

The paper describes the algorithm for solving the inverse problem.

A comparison of the obtained results with the results obtained by other methods is also provided.



a



b

Figure 1 *The result of solving the inverse problem. The first three tablets are initial data, the next three are the result*

This work is a continuation of a study that has been going on for several years (Myrontsov et al., 2021a, 2021b, 2021c, 2021d, 2022; Karpenko et al.. 2021).

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