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## APPROACHES TO MODELING OIL AND GAS FIELD DEVELOPMENT

Relevance: The study of field modeling processes is an important stage in the oil and gas industry.

Purpose: The purpose of the research was to determine the process of modeling field development. Processing of data obtained during exploration and creation of a design model in software.

Hydrocarbon production is a complex process in which it is necessary to constantly involve new technologies to increase the efficiency of work and maintain the profitability of the project.

Hydrocarbon deposits usually have a complex and irregular geological structure, uneven thickness and different properties of the productive formation. It is these factors that influence the design of field development. To solve these problems, they began to develop software for interpreting a small amount of data in the exploration of new deposits. This technology provides great opportunities in a short time to get a probable picture of the field without involving exploration, which leads to a reduction in the time when searching for new fields and obtaining reports on it, a significant reduction in the cost of exploration.

In Ukraine, the development of technologies for modeling field development is at a low level, compared with other countries. This situation was due to small hydrocarbon reserves. Ukraine is only now beginning to gain momentum with the search for new reserves to support the economy and infrastructure of the country in the current conditions.

The attraction of technologies for designing a geological and technical model of hydrocarbon fields in Ukraine is gaining increasing popularity. The essence of the process is data processing using modeling algorithms and mathematical calculations to obtain a three-dimensional model of fields, analyze the productivity of oil and gas wells and estimate reserves. The 3D model represents a simulation of the field location during development, allowing

Modeling technologies should address the following issues:

- improved efficiency of geological exploration;
- selection of rational development technology;
- business case for field development management.

So, in the country there are large deposits, such as Machusskoye, Zagoryanskoye, Sagaidatskoye, Semyrenkovskoye, Yablunovskoye and others. But the exploitation of part of the fields has been going on for a significant number of years, which can lead to a decrease in well production without certain involvement of technologies to maintain the return of hydrocarbons.

At present, seismic survey in the format of 2D-field data and well drilling results is used in Ukraine to obtain a geological model of the field. The obtained data are formed on paper in the form of profiles and maps, which does not allow making adjustments, obtaining a visual form of deposits and the shape of the well. This technology does not allow for a short period of time to create a model of the field, to analyze its profitability, to design the most profitable placement of the well.

The involvement of the Harmony program for modeling will increase the rate of drilling exploratory wells. This is a comprehensive engineering program for analyzing hydrocarbon reserves and wells on them. This program allows you to create a 3D model of the site using geological and seismic data.

Based on the data obtained during geological exploration, by study and inclusion in the program, we can get an idea of the productive formation during the development process. As well as reservoir management and hydrocarbon production forecasting.

Currently, the only reliable method of exploration is seismic exploration. The seismic survey demonstrates the peculiarities of reservoir deposits and the distribution of reservoir reservoirs. Based on these data, a pattern of reflectors is formed, horizons are analyzed and reservoir boundaries are established.

The possibilities of the technology described above make it possible, based on the data obtained during seismic exploration and geophysical studies, to verify the feasibility of continuing the development of the field and the most optimal location of the well. This technology serves as a complex production process that can be quickly worked out for possible amendments to the progress of work. They make it possible to obtain:

- estimating the risk of reserves using probabilistic forecasting;
- determination of reservoir productivity during development;
- obtaining formation pressure data compared to cumulative production;
- monitoring of formation productivity;
- create accurate well types and forecast reserves;
- shorter time for searching and processing data.

The result of the simulation are digital geological grids and sets of maps that indicate the location of hydrocarbon reserves, their place of contact with rocks, as well as the geometry of the productive formation.

### **Conclusion**

The process of finding and developing new fields is a very responsible and important part in the oil and gas industry. The feasibility of continuing well design and field operation depends on this process. It is the modeling of the field that gives in a short period of time and small costs for seismic exploration and additional exploration work, to obtain a probable picture of deposits and reserves of deposits, describes the geological and hydrodynamic picture of formations at the development site.

The resulting model is submitted to the management of the enterprise for processing and resolving further actions on the fields, drilling operations for the purpose of hydrocarbon production or closing the design work on this field. It is the involvement of this technology in Ukraine that can lead to oil and gas stability and independence of the country.

### **References:**

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