Technique for Determining the Architectural Type and Main Dimensions of Floating Drilling Unit for Drilling Exploration Wells in the Russian Arctic Shallow Water Conditions

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ABSTRACT
The paper stresses the ambiguity of architectural type (AT) of floating craft for exploration drilling in shallow water conditions, as well as the necessity of using the methods of multicriterion evaluation for choosing the most rational AT. The recommended methodology is the expert judgments with determination of priority number of criteria, their ranking and calculation of versatility indicator.

The results of methodology validation are shown – the selection of rational AT for floating drilling unit (FDU) to be operated in shallow water sites – shallow-draft jack-up floating drilling unit (SDJUFDU).

The algorithm for determining the main dimensions of the SDJUFDU with regard to its operational features in distinctly various conditions (as floating object, fixed offshore structure, and transitional mode – leg penetration into soil during installation at site) is presented.

KEY WORDS: jack-up; shallow water; architectural type; algorithm; expert judgment; technique; criteria

ABBREVIATIONS:
AT – architectural type;
FDC – floating drilling complex;
FDU – floating drilling unit;
PHDAS – potential hydrocarbon deposits and structures;
SDJUFDU – shallow-draft jack-up floating drilling unit;
SFDU – submersible floating drilling unit.

There is a number of potential hydrocarbon deposits and structures (PHDAS) on the Russian shallow marine shelf. Development of these PHDAS is an actual issue for today. The majority of PHDAS is concentrated in the Kara Sea (Priyamal shelf, Ob and Tazov bays) and in the Caspian Sea.

Fig. 1. FDC Obskiy-1 SFDU Obskaya on the top, depot ship Tazovskaya on the bottom

Since 2006, Krylov Shipbuilding Research Institute has been actively participating in development of projects that provide safe operation of FDC. During this period, the operator of unit LLC “Gazflot” faced some problems related to soil erosion under SFDU bottom, the danger of impact of depot ship Tazovskaya to SFDU Obskaya during mooring operation, impossibility to provide stability of SFDU on soft ground.

The adversities mentioned above have become a good push to search other, more acceptable technical decisions and concepts that allow carrying out exploration drilling on the Russian shallow marine shelf starting from 3 m depth.