Editorial

MODERN TRENDS IN HYDROCARBON RESOURCES DEVELOPMENT

The importance of hydrocarbon resources and the oil and gas industry is currently difficult to overestimate. About one third of the world's natural gas reserves are concentrated on the territory of the Russian Federation; in terms of oil reserves Russia is second only to five states, but even this is enough to develop and improve this branch of production. The Strategy for the Development of the Mineral Resource Base of the Russian Federation until 2035 outlines promising directions for economic modernization. They include rational use of the created mineral resource base by means of engaging hard-to-recover oil and gas reserves and undeveloped solid mineral deposits, reducing the negative impact of subsoil development on the environment, qualitative improvement of the information support system for subsoil use, monitoring and control over the development of the mineral resource base of the Russian Federation by developing information technologies. This requires, among other things, introduction of automated management and regulation systems in the field of geology and subsoil use, as well as systems for processing, interpretation, storage and provision of geological data to subsoil users.

This special issue of Journal of Mining Institute brings together articles reviewing advances in the development of hydrocarbon resources. The mainfocus is on the construction of oil and gas wells and hydrocarbon production, treatment, transportation and upstream processing.

Nowadays it is difficult to imagine oil and gas industry without different kinds of modeling (physical, simulation, mathematical, etc.). Application of mathematical modeling methods for well workover and killing are discussed in papers by *Dmitry V. Mardashov* with colleagues (DOI: 10.31897/PMI.2022.16) and *Ramiz A. Gasumov* with colleagues (DOI: 10.31897/PMI.2022.99). Physical modeling using true triaxial loading apparatus to determine parameters for the method of targeted formation unloading is presented in paper by *Vladimir I. Karev* with colleagues (DOI: 10.31897/PMI.2022.95). Study of corrosion processes occurring in gas pipelines by means of autoclave modeling is demonstrated in paper by *Nikita O. Shaposhnikov* with co-authors (DOI: 10.31897/PMI.2022.92). Modern information technologies related to application of machine learning and neural network technologies in oil and gas fields development and hydrocarbon resources transportation are also reflected in the articles of the Special Issue. The paper by *Evgenii V. Filippov* with colleagues (DOI: 10.31897/PMI.2022.103) shows the patterns of fracture formation during hydraulic fracturing of carbonate rocks. Hydraulic fracturing is an effective method of oil production stimulation and is widely used nowadays in various conditions including complex carbonate reservoirs. The paper by *Mariia Yu. Zemenkova* with colleagues (DOI: 10.31897/PMI.2022.105) presents intelligent monitoring of the hydrocarbon pipeline state using neural network technologies. The authors have developed the concept of a modern safety monitoring and control system of the latest technological generation focused on providing comprehensive engineering control using integrated automated control systems to create an intelligent methodological support during introduction of import-substituting technologies.

A number of articles are devoted to the equipment and technology for drilling oil and gas wells. For example, an article by *Mikhail V. Dvoynikov* and colleagues from the scientific centre "Arctic" of Mining University provides a historical and technological overview of drilling deep and ultra-deep wells in order to find and explore new mineral deposits (DOI: 10.31897/PMI.2022.55). The efficiency of well construction directly depends on the type, properties and flowing mode of flushing fluids used during drilling. *Seyyed Shahab Tabatabaee Moradi* (DOI: 10.31897/PMI.2022.67) discusses the Monte Carlo simulation of hydraulic parameters of well drilling. Based on results of probabilistic study, it is established that a decision on optimization of wellbore cleaning parameters should be made taking into account conclusions of uncertainty analysis. The paper by *Vasiliy I. Nikitin* (DOI: 10.31897/PMI.2022.93) is dedicated to solution of velocity distribution problem for laminar flow of non-linear viscous flushing fluid in annular space of the well. The development of the composition

of barite-free drilling mud and study of its rheological characteristics are presented in the work of *Ekaterina L. Leusheva* and colleagues (DOI: 10.31897/PMI.2022.38).

In paper (DOI: 10.31897/PMI.2022.108) *Natalya V. Shatalova* and colleagues presented a renovation method of well productivity recovery using wave fields. In paper (DOI: 10.31897/PMI.2022.59) *Qi Chengzhi* and colleagues also considered the issues of increasing permeability of near-bottomhole formation zone with low-frequency wave impact.

Comparison of approaches to assessment of pore space compressibility is presented in paper by *Vitaly S. Zhukov* and *Yuri O. Kuzmin* (DOI: 10.31897/PMI.2022.97). The paper by *Igor I. Bosikov* with colleagues (DOI: 10.31897/PMI.2022.98) established that application of hydraulic fracturing technology during well construction allowed to increase vertical permeability and unite disparate parts of reservoir in practice, which determined efficiency of studied hydrocarbon field development. The work devoted to the evaluation of the influence of fracture parameter uncertainty on the dynamics of technological indicators of the Turnei-Famen oil deposit development was presented by *Aleksandr A. Kochnev* with colleagues (DOI: 10.31897/PMI.2022.102).

The article by *Aleksey M. Kuzmin* with colleagues (DOI: 10.31897/PMI.2022.104) deals with the issue of increasing the energy-efficiency of container-based gas chemical units for methanol production in field conditions. The relevance of this area is currently driven by the need to develop remote Arctic hydrocarbon fields. The object of research is the process of energy-efficient conversion of waste gases energy and surplus thermal energy in a small-scale methanol production plant using the technology of synthesis-gas generation by non-catalytic partial oxidation of natural gas.

Underground mining releases large amounts of gas, so mining productivity is reduced and risks increase. One effective method of degassing coal seams is the drainage wellbore method, which involves drilling wells from the back drift to an unstressed zone in the roof or sole seam of the mined-out section. A study by *Ali Hosseini* with colleagues (DOI: 10.31897/PMI.2022.106) obtained and analyzed data to determine the suitable distance between coal seam degassing stations based on the drainage wellbore placement method.

Many tasks of hydrocarbon development cannot be solved without the support of relevant committees and ministries. Work of *Oleg V. Zhdaneev* (DOI: 10.31897/PMI.2022.107) considers the issues of ensuring the technological sovereignty of the fuel and energy industry in the Russian Federation.

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