Annotated list of articles


In the article a short analysis of the modern works devoted to the generalized cubic equations of state is made. Thus, the main attention is paid to studies aimed at increase of accuracy of calculations of thermodynamic properties of substances. Results of check of the most reliable generalized cubic equations of state in relation to calculation of the main thermodynamic properties – density, isobaric and isochoric heat capacities – are presented. For check the values of thermodynamic properties calculated on the most reliable modern fundamental equations of state are used. Data are calculated on isobars 0,1, 0,5p, 0,8p, 1,1p, 1,5p, 3,0p, 10p, 30p (where p – critical pressure) in the temperature range from the melting line to 700 K, including the saturation line.

Comparison is made for 33 substances representing natural hydrocarbons (alkanes, naphthenes and aromatic), and also the accompanying gases. It is shown that reliable calculation of thermodynamic properties in a liquid phase of hydrogen and water can’t be executed on the generalized cubic equations of state, and the Harmsen–Knapp equation in a generalized view doesn’t allow to make calculations of thermodynamic properties because of negative value under square root. The Peng–Robinson and Patel–Teja equations of state should be considered the most reliable and universal.

Average relative deviations of calculation of thermodynamic properties in liquid and gas phases and in a supercritical region are presented in article.

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Aleksandrov I.S. Fundamental equations of state for o-m-p-xylenes / I.S. Aleksandrov, A.A. Gerasimov, B.A. Grigoryev // Oboronnyy komplex – nauchno-promyshlennost’ models created on the base of the proposed method provide reliable information on the properties of a reservoir fluid in development of flow simulation both using a reservoir simulation compositional models and using «live oil» and «wet gas» options of «black oil» models.

The method is illustrated by an example of creation of the adequate PVT-model of Russian natural gas condensate mixture.

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On the base of the principle of critical phenomena universality and the hypothesis of thermodynamic fields’ mixing, the equation of state (EOS) for near-critical mixture with given composition has been formulated. To verify the validity of the obtained EOS, it was applied in research of stratal hydrocarbons systems. – Moscow: Gazprom VNIGAZ, 2015. – № 4 (24). – P. 21–29.


The article analyzes a gas branch of spinodal (the limits of thermodynamic stability) for one-component and binary hydrocarbon mixtures. It is

References


The article analyzes a gas branch of spinodal (the limits of thermodynamic stability) for one-component and binary hydrocarbon mixtures. It is
pointed out, that the existing modelling complexes do not allow calculating properties of hydrocarbon mixtures within metastable area. Regarding this a program code has been developed, as well as thermodynamic stability determinant and spinodals for one-component and binary mixtures of hydrocarbon gases have been calculated according to different equations of state. It is demonstrated that chosen equation of state considerably influences the calculation of thermodynamic stability of hydrocarbon mixtures. An area of quick decrease of system thermodynamic stability long before a spinodal line, when the temperature of the system falls down, is detached. When a gas-dynamic device (throttle, ejector, expander, gas-dynamic separator) is working, such calculations allow to single out thermobaric parameters of a gas flow, when intensive «collapse» condensation of the heavy mixture components starts. So, at gas-dynamic separation it is expedient to provide considerable cooling of natural gas in order to reach an area of quick condensation of heavy components, which is being associated with rough decrease of determinant of thermodynamic stability.

References


The article considers an application of effective mathematical method of phase equilibria calculations in natural gas condensate systems adjusted for presence of residual water in pore spaces of collectors. This method is based on the three-parameter Peng–Robinson cubic equation of state and the Huron–Vidal mixing rule.

Huron–Vidal mixing rule is used in *PVT*-modeling (PVT – pressure, volume, temperature) instead of classical mixing rule for the correct description of the presence of polar molecules (water, methanol, salt) in a multicomponent system. The applicability of the method is shown in comparison of the results of *PVT*-modeling calculation and experimental data for binary mixtures of water with methane, ethane, propane, n-butane, carbon dioxide and hydrogen sulfide. The new values of parameters used in Huron–Vidal mixing rule are proposed. These values allow to increase the accuracy of phase equilibrium modeling of binary mixtures in a wide range of pressures and temperatures.

The results of calculation of water content in hydrocarbon mixtures obtained using engineering formula (Bukacek method) and mathematical method based on the Peng–Robinson equation of state and Huron–Vidal mixing rule are compared. The effect of the residual water presence on the behavior of gas condensate reservoir systems during deposits development is estimated on the basis of mathematical modeling of constant volume depletion test (CVD-test) with the application of the used method of multiphase equilibrium calculation.

An example of the effect of residual water on the *PVT*-properties of natural rich condensate system at high temperature reservoir condition is considered.

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Natural gas hydrates are non-stoichiometric inclusion compounds that consist of three-dimensional lattice of water molecules (forming a host clathrate structure) with gas molecules (guests) inside clathrate cages. These water clathrate structures (that are less thermodynamically stable than ice or liquid at the same conditions) are stabilized via van-der-Waals host-guest interactions.

There are natural gas hydrate deposits in the shelf and permafrost regions. These deposits have been under active investigation for more than forty years as a perspective fuel source because of high methane content. At the same time the gas hydrates that exist at temperatures and pressures close to their decomposition conditions are considered as ecologically unsafe. In the case the thermal equilibrium changes, the released methane could contribute significantly to the greenhouse effect. That is why the knowledge of dynamic, thermodynamic and mechanic properties of gas hydrates is important for predicting their behavior during gas extraction from natural gas hydrate deposits.

During the last years a lot of theoretical, experimental and computer studies of gas hydrates have been performed. The investigations of the deposits in Alaska, Canada and Japan show that gas production from hydrates is achievable with current technologies. Moreover, the first ever gas production facility of this kind has been opened (Nankai Trough Methane Hydrate Site).

Molecular dynamics allows studying the properties of materials at the microscopic level, and its development resulted in the understanding of several fundamental gas hydrates properties. Both mechanic and thermodynamic properties of gas hydrates in a wide range of temperatures and pressures were studied for different hydrates, a certain level of understanding of the hydrate formation mechanisms was achieved.

References


Tempting prospects of shale oil and gas fields’ development has driven intensification of studing processes in the low-permeable reservoirs, containing a lot of organogenic material (kerogen). One of motives for such heightened interest is a fact that real indicators of development occurred to be higher than predictive ones, gained by means of traditional calculation techniques. Studying of physical basics of fluids’ movement and adequate math models will allow grounding more optimistic ways to develop this type of resource.

Among the characteristic features of reservoirs being examined are: small dimensions of pores, which contain the main reserves of gas, presence of significant amounts of gas in adsorbed state, presence of dissolved gas in kerogen.

The article briefly overviews mathematical models of separate (elementary) processes presented in scientific literature. A way to integrate these models and to create of complex models based on the concept of multicontinual media, such as interstitial and porous media, adsorbed gas and kerogen, is suggested. A set of media and exchange processes is being selected depending on features of a particular reservoir.
The tasks appearing at different representation of exchange articles are discussed. At the final part of the paper some methods of numerical simulation are examined. An algorithm of self-similar solving of tasks for infinite strata and examples of computer calculations by means of Fortran program are suggested.

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For the first time complex physicochemical studies of condensates from 5 exploration wells of Yuzhno-Kirinskoye gas-condensate field, which is the primary object of the Sakhalin offshore development in the framework of the Eastern gas program of PAO «Gazprom», were held. Development of Yuzhno-Kirinskoye field started in 2010. Drilling of the first two wells on the Yuzhno-Kirinskoye structure has identified industrial gas-condensate deposit in the rocks of Dagi Miocene horizon. In 2013–2014 wells № 3–6 were drilled.

Due to the fact that in the coming years commercial operation of the Yuzhno-Kirinskoye field is planned, the study of the chemical nature and directions of rational use of condensates is relevant and timely. It is established that condensates of the Yuzhno-Kirinskoye field, selected from exploratory wells № 1, 2, 3, 5, 6 of three operational facilities, belong to condensates of light (wells № 1–3 with, condensate density is of 742,0–748,8 kg/m³) and medium (wells № 5–6, condensate density is of 750,1–754,6 kg/m³) types. These condensates are low-paraffin, low-resin, low-sulfur, their chemical composition corresponds to methanenaphthenic type. They boil away at the temperature range of TC–300 °C with the residue of 5,5–6,4 % wt. Physicochemical characteristics of the condensates are similar, but not identical. For all parameters there are some variations.

Gasoline, kerosene and diesel fractions of the condensates are characterized by high yields, favorable chemical composition and high level operational characteristics, which allow to recommend these fractions as a basis for gaining respective fuels. Two ways to process the condensates of Yuzhno-Kirinskoye field are recommended: 1) «fuel variant» is to use gasoline, kerosene and diesel fractions of the condensates as a basis to produce the fuels of various grades; 2) «petrochemical variant» – to produce valuable hydrocarbons for the petrochemical industry from easy parts of condensates (up to 150 °C) – methycyclohexane, toluene, xylens, since their content in condensates is visible: methycyclohexane – 4,2 to 4,3 % wt., toluene – 2,4 to 2,6 % wt., xylens – 3 to 4 % wt.

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The Yuzhno-Kirinskoye field is located in the Okhotsk Sea on the North-Eastern Sakhalin offshore at a distance of 35 km from the coast. The sea depth in the area of the field varies in the range of 110–320 m. Yuzhno-Kirinskoye structure is one of the major structures identified through seismic exploration in the Kirinsky block. In 2010–2014 this structure 6 wells, which established existence of industrial gas-condensate deposit in the Dagi horizon, were drilled.
It is a multilayer deposit, thickness of its productive layer is 14–16 m.

Due to the presence of anomalous zones in the thick of the Dagi horizon, which were detected by means of the 3D seisms, and to very complicated tectonics, it seemed interesting to identify the geochemical characteristics of the component composition of the condensates on the area of Yuzhno-Kirinskoye field. Using the capillary gas-liquid chromatography (GLC) and infrared spectrometry the geochemical characteristics of the condensates from the Yuzhno-Kirinskoye field were obtained. According to the results of gasoline fractions GLC, the various ratios were calculated being the indicators of conditions of the organic matter source formation and the degree of its catagenic transformation.

It is established that the condensates from six exploration wells of the Yuzhno-Kirinskoye field are similar in fractional and component composition, but not identical, being formed from organic matter of mixed type. By alkane ratios the fluids of the Yuzhno-Kirinskoye field refer to condensates of gas-condensate-oil deposits with oil rims. By the ratios of hydrocarbon gasoline fractions the fluids of the Yuzhno-Kirinskoye field are secondary condensates. For the condensate from the well № 4 some differences in comparison with other condensates of the field are identified, which are probably connected with location of the well on the Western end of the structure.

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Determination of gas-condensate reservoir characteristics of systems of deep-seated deposits especially with a complex composition of the reservoir gas is associated with significant difficulties: a lot of depth, pore pressure prediction, the complex composition of the reservoir gas, high content of C₅⁺, the possible presence of aggressive components H₂S, CO₂.

On the example of three deep-seated deposits (Astrakhan, Achimov deposits of Urengoy field, the Jurassic sediments of Arctic foxes field) the procedure for conducting gas-condensate research, as well as results of determining the stratal gas composition, physico-chemical characteristics of the condensate, and thermodynamic characteristics of stratal mixtures are shown.

Changes in composition, properties and phase characteristics of the stratal mixtures of three deep-seated deposits are analyzed. It is shown, that the amount of condensate extraction depends on the following factors:

- potential contents of condensate in gas formation;
- composition of a gas reservoir;
- temperature and pressure conditions of deposit location;
- degree of reservoir system saturation with C₅⁺ hydrocarbons;
- enrichment with intermediate hydrocarbons of gas phase;
- content of H₂S and CO₂ in gas formation.

Changing in values of listed parameters significantly affects extraction of condensate from the bowels; but stretched fractional composition and high content of naphthenic hydrocarbons on the contrary worsen the solubility of stratal condensate in the gas thereby reducing the volumes of condensate recovery.

References


The method for calculating heat capacity of sand and carbonate rocks saturated with hydrocarbons is examined. It is assumed, that the rock-fluid system obeys the Neumann–Kopp rule of equal additivity. Influence of temperature on the heat capacity of rock-forming minerals is estimated by the Mayer–Kelly equation. For practical calculations to temperatures of 600 K the lithological heat-capacity triangles for sand and carbonate rocks are suggested. The heat capacities of saturating hydrocarbons in various phase states are calculated by means of the mentioned comparative methods.

References


Formulas of rigorous kinetic theory and various semi-empirical methods are now being used to calculate the thermal diffusion factor (TDF) for multicomponent gas systems. According to the conducted experimental studies, the calculation of TDF using rigorous kinetic theory gives the deviation of about 10%–100%. In addition, for certain values deviations are not only quantitative but qualitative, too.

In the paper, the calculated and experimental values of TDF for ternary gas system H2-N2-CO2 and for the corresponding binary systems are given. The calculation was performed for the Lennard–Jones potential. It is shown, that while using classic combinational rules for calculating parameters of the interaction potential of diverse particles, the calculated values of TDF disagree with experimental ones significantly – by 10–60%.

Values for the parameters in the Lennard–Jones potential in regard of interaction of diverse molecules have been matched, which, then, have been used for calculating the values of TDF for binary gas systems within the framework of the rigorous kinetic theory. The calculated values are consistent with the experimental data. Use of these calculated parameters of the Lennard–Jones potential for the interaction of diverse particles leads to an agreement between the calculated and experimental values of TDF in the ternary gas systems.

Thus, the formulas of rigorous kinetic theory can be applied for the calculation of thermal diffusion characteristics for multicomponent gas systems, but selection of the method for finding parameters of potential for interaction of diverse particles is still actual.

References


Using the precision adiabatic calorimetry method the density and hydrate number of propane hydrate were determined at the thermobaric conditions of liquid and gaseous propane. Density and hydrate number of propane hydrate were determined based on the measured ratios of pressure and temperature differentials dP/dT along an equilibrium line of «hydrate – ice (water) – propane», as well as on the basis of enthalpies, balance and strict thermodynamical relationships (Clapeyron–Clauzius equation). Usability conditions of Clapeyron–Clauzius equation for the «water – pure alkane» system were determined.

Density is one of the thermodynamic parameters of any substance, including gas hydrates. Density and hydrate number measurements are accompanied with a number of difficulties. Therefore experimental data of these parameters are determined only for a small quantity of hydrates.

Experimental values of density and hydrate numbers of pure alkanes must be used for selection of the technological regimes of the wells exploitation.

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Development and exploitation of the problem Chayanda oil-gas-condensate field (OGCF) will require new technological approaches and solutions. One of innovation is the water-alternating-gas (WAG) technology. In the case of WAG, it is important to know in advance – what minimum salinity the reservoir water must have before injection into the deposit to prevent hydrate formation processes.

This paper presents the results of the experimental study of the processes of hydrate formation during filtration of gas and water with various extents of mineralization within the single capillary at Chayanda OGCF reservoir conditions. Methane gas and separation gas of Botuoba horizon were used as gas phase, and solutions of calcium-sodium salt in distilled water were used as the liquid phase. It was found experimentally that hydrate formation for methane occurs at water salinity below 150 g/l and in the case of gas separation the one occurs at salinity below 200 g/l.

In addition, the processes of methane hydrate formation and decomposition in filtering mode and with temperature changes in Chayanda OGCF stratum physical model at initial water saturation of 64 % were studied in detail.

Most susceptible parameters of hydrate stratum filtration in the forms of pressure drop in reservoir model and the excess volume of gas evolved in process of hydrate decomposition were found out. It is shown that 30 % of water contained in reservoir model transfers to hydrate phase during methane hydrates formation.

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Experimental study of the flow velocity influence on the risk of rock fracturing was performed for productive sediments of Dagi formation regarding one of the gas fields at the sea shelf of Sakhalin. The experiments were held under conditions of equiaxed and non-equiaxed stress of the matrix of dry or partially water-saturated reservoir rocks in a wide range of reservoir properties. Rocks fracturing did not occur when the average pressure gradient for the collection of core samples reached 25–30 MPa/m. It is shown, that destruction of the dry and partially water-saturated cores didn’t occur even in a case of a shear stress. It was found, that filtration of water during centrifuging provided a stronger effect on the structure of the rock matrix than gas flow with large gradients in situ stress conditions.

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Southern periphery of the Chayanda oil-gas-condensate field is being characterized with both quite complex structure of lower-Vend terrigenous deposits and absolutely insufficient extent of their knowledge. In 2014 at this territory the 3D-seismic surveys were held and structural maps were composed in regard of some reflecting seismic horizons including a cover of Botuobinskiy and a bottom of Hamakinsky productive deposits. Analysis of acquired materials shows, that location of faults at all these maps does not depend on the age of deposits and is constant. So, one can conclude, that maps depict either only young faults, which have been generated after forming of the Vend terrigenous carbonate rock complex, or the faults that have demonstrated their activity repeatedly. Today a question, if there are some intra-structural or buried faults in this region, is still open. These faults could appear during the periods of severe structural transformations, when the deposits of one or another age under the influence of tectonic forces went upwards, were washed-out or, vice versa, submerged deeply.

Besides the prospect to enlarge the area of gas and oil fields due to the studied region, it seems promising that nearby a well number 808 it is planned to create in the HM2 stratum of the Hamakinsky productive horizon an underground storage for concentrated helium. In this context the interesting fact is that various authors differently divide and compare the sections of wells drilled here.

Four correlation schemes, which were composed by the authors of this article using field geophysical data and macro description of core characterizing the deposits of the terrigenous Vend in the south part of the Chayanda oil-gas-condensate field, bring out clearly, that in a mainly mudded off thick, overlapping the HM2 stratum, there are no reservoir rocks. This interval of rocks could be with gross certainty assumed to be a cover for the underground storage of concentrated helium.

References


Necessity to create an underground storage for concentrated helium nearby the well number 808 became a serious reason for carrying out 3D-seismic
survey at the southern periphery of the Chayanda field. In order to detail the inner structure of the low-Vend terrigenous deposits in this region a correlation scheme was composed within the range from sulphate-carbonate rocks of the Byukskaya suite formation to siltstone-sand-gravelly deposits of the Talakhskaya suite formation along a line of 321-56, 321-58, and 321-75 wells. Within a section of wells 19 geophysical and lithological synchronous reference horizons were marked out.

Using methods of cyclostratigraphy analysis a thick of the terrigenous Vend in the southern part of the Chayanda field is decomposed in details and correlated, the history of forming for a complex of rocks, revealed with the 321-56, 321-58, 321-75 wells, is shown. No one well overlapping the HM2 productive stratum, where the underground storage for concentrated helium is going to be created, contains any reservoir rocks. In respect to lithologic-phase research, a predominantly muddied rock interval located above the HM2 stratum could be concerned a reliable tight fluid-trap properties, it could seriously reduce usable area of the helium underground storage.

**References**


The article is devoted to refining the inner structure of the Middle-Miocene Upper-Daginskiy oil-and-gas-bearing deposits at the Northern-East shelf of Sakhalin. Issue of raw fuel supply is of current importance at the Far East, where liquid and gaseous hydrocarbon agglomerations have been intensively explored and surveyed last years. In this regard the most prospective are the territory of Sakhalin and the waters of its continental shelf. Geological structure of the island and its shelf demonstrates participation of metamorphized rocks from a dislocated foundation of mesozoic and other ages, and also Cainozoic deposits of sedimentary cover (Paleogene, Neogene, and Quaternary systems), which are presented with huge, mostly terrigenous thicknesses.

Concerning the oil and gas deposits the Upper-Daginskiy stratigraphic subhorizon of the Middle Miocene is quite interesting. It is presented mostly with alternation of sandstones, siltstones and clays.

Cyclostratigraphic analysis enabled to compose 4 correlation schemes, to reveal and retrace in the sections of wells the spatial location of even-aged deposits related to 5 sedimentation cycles, and 20 synchronous reference horizons. Along with five wash-out surfaces, which are revealed and shown at the correlation schemes, the well sections contain some evidences of additional local wash-outs, which did not affect the whole field area. Most likely it is caused by numerous tectonic blocks, which were moving vertical in different periods of time. The hydrodynamic relationship of these blocks should be studied carefully.

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the Yuzhno-Kirinskoye oil-gas-condensate field Daginskoye suite formation was determined. In regard to physical modelling of field development process the following parameters were evaluated: the complex changes in physical properties of rocks at the stratal pressure decrease of 10 MPa and correspondent effective pressure increase from 37 to 47 MPa. Mean voids ratio reduced at 0.049 absolute %, relative change gave 0.024 %. Velocity of longitudinal wave increased at 0.070 km/s, i.e. at 2.0 %. Velocity of traverse wave increased at 0.019 km/s, i.e. at 1.17 %. Bulk density increased at 0.00071 g/cm³, i.e. at 0.034 %. Compressibility of pore space increased at 1.67·10⁻⁵ 1/atm, i.e. at 10.5 %. Average value of gas permeability decreased at 0.242 mD, i.e. at 0.144 %. All changes are given in relation to the average values of petrophysical parameters at the effective pressure in a stratum equal to 37 MPa.

Changes in a number of rock petrophysical parameters due to the increase of effective pressure were analyzed and estimated to a first approximation. Obtained dependencies often differ from the linear ones. So, they are to be refined in the course of additional experimental studies. Acquired results will help to evaluate changes in stratal conditions, detected according to the data of geophysical research of wells, and to estimate an extent of changes in productive horizons due to reduction of stratal pressure during development of a field.

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Geographic and geophysical knowledge about the Arctic regions of the West-Siberian oil-and-gas-bearing megabasin are studied unequally. Some provinces and districts are surveyed in detail, others are being now at initial stage of geological surveying. Tazovsky Peninsular is relatively well studied, the Yamal Peninsular is known quite worse, the worst known territory of the West-Siberian megaprovince is the most northern and hard-to-reach Gydan oil-and-gas-bearing province.

A junction zone of Yamal, Nadym-Purskaya and Gydan oil-and-gas-bearing provinces is characterized with various oil-and-gas-bearing capacity both by section, and by area. Survey works indicated rather wide age-related range of oil-and-gas-bearing capacity in this zone. Industrial-scale agglomerations of hydrocarbons were found beginning from the Cenomanian cover to Paleozoic sediments.

Prospects of further oil and gas searching and surveying in the studied region are stipulated for a number of criteria. The main criterion, determining a character of structures’ forming and sedimentation, is tectonic development of the studied zone. In regard to tectonics, the stage of continental rifting exerted the main influence on forming of structures. Differentiation of tectonic movements promoted hypsometric separation of territory. Such separation was reflected in a structure of the Mesozoic-Cainozoic cover as a whole. Differentiated tectonic movements of a foundation in many respects predetermined phase heterogeneity.

Along with tectonic criterion, which determined character of sedimentation, a stratigraphic factor is not less important. It has determined consistency of sediments by section and by area. Peculiarity of the studied junction zone is its timing to an area of phase zones’ substitution in Jurassic and Cretaceous sediments.

Besides sediments’ distribution by area and sections, one is to consider a lithologic criterion, which determines the quality of reservoirs and covers. Lithologic features of the studied region are presented on a scale of oil-and-gas-bearing complexes.

Taking into account the criteria of search and the level of geological and geophysical knowledge about the region, one can state, that the main outlooks for further hydrocarbon fields search and survey are connected with the Gydan Peninsular and adjusted areas of the Tazovsky and Ob gulfs. On the basis of analyzed hydrocarbon deposits’ allocation within the oil-and-gas-bearing complexes some recommendation on research and surveying of fields are done.

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The article reviews modern methods of computer atomistic modelling for molecular systems in regard to the questions of hydrocarbons’ recovery. Atomic modelling allows calculating properties of substances ab initio, i.e. without experiments. Here the examples of atomistic models used for description of equations of state and transport properties of molecular compounds are examined. It is shown, that modern atomistic models of hydrocarbons are highly withstand (i.e. homologous molecules are being constructed of similar «blocks» with given parameters of interaction) and at the same time precisely reproduce in the course of computer experiment phase diagrams of individual substances and binary mixtures. The approaches to calculation porous media permeability for coercible molecules are examined. Corresponding examples of calculation by means of direct modelling according to the molecular dynamics method are suggested. Examples show both single-phase and multi-phase flows, where due to gas condensation in pores the permeability of one component can change spasmodically. On the basis of data from scientific publications one can conclude, that results of atomistic modelling may be used along with experimental data as the input information for hydrodynamic stratal models.

References


The article reviews transfer of licenses to use the sites containing reserves of raw hydrocarbons and located completely or partly at the sea shelf of Russian Federation in a period from 1993, when the first offshore-site licenses were legalized, to 2015. There is information on dynamics of changes in the quantity of licensed sites as well as their allocation over the sea waters of Russian Federation and distribution by types of license (for exploration, for extraction of hydrocarbons, and through licenses for research, survey and extraction of hydrocarbons). Distribution of licenses by the main developers, such as Gazprom, Lukoil, Rosneft, NOVATEK, is also analyzed. Separately the licensed sites possessed by the independent companies and companies working on the grounds of the Production Sharing Agreement, and the sites being researched according to state contracts (regional research works, mapping, preparation for licensing etc.) are examined.

Primary the chronology of main events in offshore licensing is presented. Besides, the main changes in legislation related to the licensing of the offshore subsoil sites, affecting the correspondent activity in subsoil use (liberalization or complication of licensing, alteration of terms of license granting, etc.) are listed.

Sites’ distributions by license types, developers and regions are visualized with corresponding diagrams and schemes of sites’ allocation. The sites, which could be transferred to developers in the nearest future (by means of auctions, competitions or regulations of the RF Government), are listed.

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