**ANAS Transactions** **Earth Sciences** **2 / 2019**

*Geology and geophysics*

http://www.journalesgia.com

# THE STOCHASTIC CHARACTER OF DISTRIBUTION OF GRANULOMETRIC CONTENT AND FRACTALITY OF POROUS STRUCTURE IN OIL RESERVOIRS

**Gurbanov V.Sh.[1], Hasanov A.B.[2], Abbasova G.G.[2]**

[1]*Institute of Oil and Gas, Azerbaijan National Academy of Science*
*9, F.Amirov str., Baku, Azerbaijan, AZ1000,*
[2]*Azerbaijan State Oil and Industry University*
*35, Azadlig ave., Baku, AZ1010, Azerbaijan: adalathasanov@yahoo.com*

***Keywords:*** *intergranular porosity, terrigenous reservoirs, grain packing, fractality index, particle size analysis, dominant fractions*

***Summary.*** It is known that main oil reservoirs are allocated in terrigenous sedimentary rocks representing a structured matrix with texturally organized pore space. In turn, the typical structured matrix is composed of mineral grains of various sizes that look like chaotic systems. This paper describes detailed analytical review of cores grain-size analysis results from wells of one of the well-known oil deposits in Azerbaijan. The studies covered the most typical for the region productive reservoirs containing pelitic, aleuritic, fine-grained sand and medium-grained sand fractions. Results of fractions content variation depending on depth are presented in the form of circular diagrams of porosity changes according to the fractional composition and mechanical compaction of sediments. The calculation of the pairwise correlation coefficient between the fractions and the parameters averaging the particle size distribution and reflecting the sorting of the rocks showed that they are independent and unrelated by any functions. At the same time, the influence of individual fractions, and most importantly their ratio on the value of intergranular porosity, is not equal. Detailing of the modeling process of multimodal distribution has shown that the use of fractal concepts is more efficient in this issue. To assess reservoir characteristics of the oil rocks, alternatively the dependence between fractality index and oil saturation was calculated.



## Introduction

In recent years, new views on the formation of oil and gas fields through the migration and accumulation of hydrocarbons in the upper crust have been actively discussed in the scientific literature. Moreover, the determining condition in this process is the structure of the pore space and the presence of deep permeable drainage systems. It is believed that in general the natural potential of the productive capacity of terrigenous reservoirs is largely determined by their intergranular porosity and nature of the grains packing. However in addition the shape of the grains as well as the ratio of the content and various size grains distribution in the rock volume also have a great influence on the porosity of the reservoirs. Attempts to simulate the common effect of influencing factors on the multimodal distribution of intergranular porosity are widely known. In this paper, for comparison with real data, detailed analytical generalizations of the actual results of the particle-size analysis of cores from wells of one of the well-known and long-exploiting oil and gas fields in Azerbaijan are described.

The most typical for the region pelitic, aleuritic, fine-grained sandy and medium-grained sandy fractions were analyzed, and the results of the distribution of fractions were presented in the form of circular diagrams.

## Main tasks

The numerous experimental practice in the process of mechanical compaction of porous media usually describes the compaction of sedimentary material on the example of well-sorted sand (Fig. 1). As follows from this figure, at the initial stage of sedimentation (depth 0-2 km) the well-sorted sand remains free, but can still be significantly compacted. In other words compaction of loose sand with an initial porosity of 40-42% at stresses of 20-30 MPa, depending on grain strength and grain size, leads to a decrease in porosity to 35-25%, which corresponds to -3 km of depth (for rocks under ordinary geostatic pressure). Moreover, well-sorted coarse sand is more compressible than fine sand (Lade, 2005; Bjorlykke, 1998). So, when pressure increases with depth the porosity may remain constant due to a decrease in mechanical compaction. At the same time the porosity caused by mechanical compaction can vary greatly, depending on the texture and mineralogical composition. The influence of the latter is estimated by the data of fractional (granulometric) analysis.

At the same time fine-grained matter (with pore sizes up to 0.1 nm) can be described as systems with a fractal structure that corresponds to the stochastic distribution of porosity, capillaries and fracture channels (Marcussen et al., 2009; Mollema, Antonellini, 1996; Muir Wood, 1990; Mondol et al., 2007). The application of fractal concepts in the development of hydrocarbon fields simplifies the analysis of the turbulent motion of liquid and gas in the pore space of reservoirs.

The studies, implemented and described in this articles, devote to clarify regularities of compaction of the pore space of oil reservoirs and determination of presence of correlation between the specific surface area and oil saturation. These studies include an analytical generalizations of data (Romanovsky, 1968) in one of the well-known and long-exploited oil and gas fields of Azerbaijan (Table 1).

At the same time, it is known that the specific surface area of the pore space in terrigenous sediments is determined by the fractional composition of the rock matrix.

Therefore, to calculate the specific surface of productive reservoirs first of all it was necessary to analyze the data of granulometric composition of the core material and establish the degree of influence of individual fractions, including the dominant ones, on the porosity (Fig. 2).

For these purposes the studied samples were divided into four groups according to the names of the rocks: clay-aleuritic sand, clay-sandy siltstones, sandy-clayey siltstones (aleurolite) and clayey sandy loam.

The separation according to the fractional content was conducted according to the grains size (fractions) and included: pelitic fraction (0.01 mm or less), silt (0.055 mm), fine sand (0.175 mm) and medium sand (0.25 mm). Selected gradation of granular sizes of rock-forming grains are quite common in most deposits in the region (Hasanov et al., 2017; Holcomb et al., 2007; Issen, Challa, 2008) and reflected in Fig. 3.

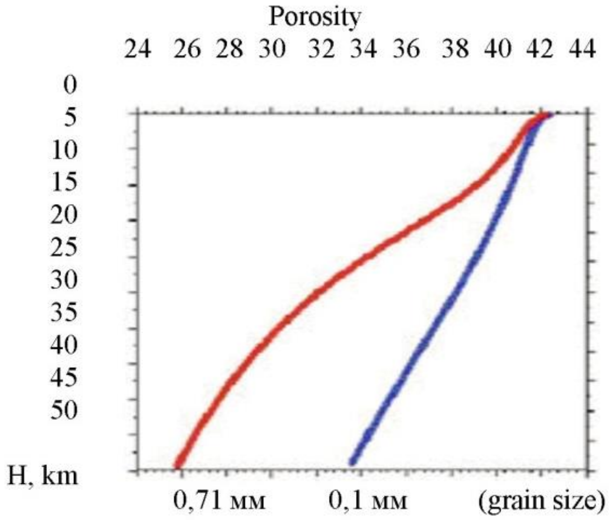



**Fig. 1.** The process of depth mechanical compaction for well-sorted sand (Levchuk, Bukreeva, 1976)

The results of our studies of the fractions distribution in accordance with the selected groups of rocks in the form of circular diagrams are presented in Fig. 3, which shows that the first group of rocks (clay-aleuritic sands) is dominated by a fraction with a grain size of 0.175 mm. The other two fractions with a grain size of 0.055 and 0.01 mm occupy approximately the same volume, and finally the fraction of coarse grains (0.25 mm) is an insignificant part of the volume and may not be taken into account. Table 2 shows the results of assessments of the effect on the porosity of the studied rocks of both dominant and minor fractions.

***Table 1***

The average values of fractional composition's data, porosity, specific surface area of the pore space and oil saturation in the studied groups of rocks

| Rock's groups (number of tests) | Fractions, мм % | | | | Porosity | Specific surface | Oil satu-ra-tion |
|---|---|---|---|---|---|---|---|
| | 0.25 | 0.175 | 0.055 | 0.01 | | | |
| Clay-aleuritic sands (14) | 2.44 | 54.13 | 28.01 | 15.31 | 25.62 | 1266 | 15.2 |
| Clay-sandy siltstones (6) | 0.39 | 27.49 | 55.54 | 16.58 | 25.04 | 1725 | 16.74 |
| Sandy-clayey siltstone (3) | 0.37 | 12.43 | 60.41 | 26.90 | 23.07 | 1851 | 15.18 |
| Clayey sandy loam (5) | 0.68 | 39.38 | 43.91 | 16.59 | 24.56 | 1611 | 17.53 |

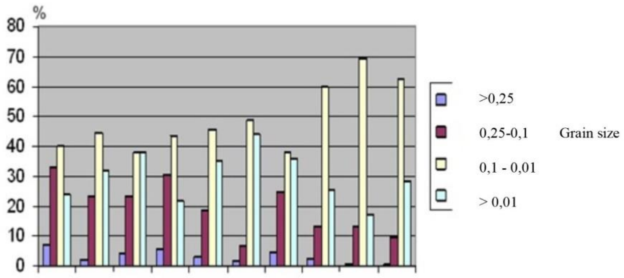



**Fig. 2.** Variations of the fractional composition of terrigenous reservoirs of some oil and gas deposits in Azerbaijan

As follows from these data, an increase in the content of the dominant fraction (0.175 mm) in the rocks of the first group (clay-aleuritic sands) leads to an increase in porosity, while an increase in the content of the fraction with a grain size of 0.055 mm reduces the porosity of this group of rocks. For the remaining 3 groups of rocks the dominant fraction is a fraction with a grain size of 0.055 mm with a different ratio of fractions of 0.175 and 0.01mm. Here just as in the first group of rocks the fraction of coarse grains (0.25 mm) makes up an insignificant part of the volume and may not be taken into account.

In particular, for the rocks of the clay-aleuritic sands group the influence on the porosity of the dominant fraction (0.055 mm) and fractions with a grain size of 0.175 mm was established. From the data of table 2 it follows that an increase in the content of both, the dominant fraction and the fraction of 0.175 mm, in clay-sandy siltstones leads to an increase in porosity.

In contrast to the group of clay-aleuritic sands in the group of clay-sandy siltstones the effect on the porosity of the dominant fraction (0.055 mm) and the coarser fraction (0.25 mm) are negative. Finally in the last group, in clayey sandy loam sediments the influence on the porosity of the dominant (fine 0.055 mm) and minor fraction (coarser 0.175 mm), as in the group of clay-aleuritic sands, also has the negative character.

Thus, an increase in the content of the fine (dominant – 0.055 mm) fraction in clayey sandy sediments leads to a decrease in porosity, while an increase in the content of the coarser fraction (0.175 mm) increases the porosity of clayey sandy deposits (Table 2).

The established patterns of changes in porosity depending on the fractional composition and mechanical compaction of sediments are very indicative, but at the same time as noted above the porosity can vary greatly, depending on the textural and mineralogical composition of the rocks. This is well illustrated by studies (Levchuk, Bukreeva, 1976; Romanovsky, 1968), in which to identify the dependence of porosity on mechanical compaction, were also used parameters averaging the particle size distribution of the rocks (Md – the grain size of the rocks) and the coefficients reflecting the sortness of the sediments (Ksort, Hr and the maximum content of any fraction Mf). The performed pair correlation between fractions and parameters averaging the particle size distribution and reflecting the sorting of rocks is given in Table 3. As follows from these data the average grain size, on the one hand, and sorting of the rocks, on the other hand, are independent and not related with any functional dependencies. At the same time there is a close correlation relationship between defined indicators (for example, Md).

Naturally in real rocks there is usually present a continuous spectrum of grain sizes, and this leads to a rather complicated scenario where fractal concepts become useful mostly. There are several examples of the application of fractal theory in assessing the reservoir properties of oil-bearing rocks (Zapivalov et al., 2009), one of which is to establish the relationship between the fractality index and oil saturation.

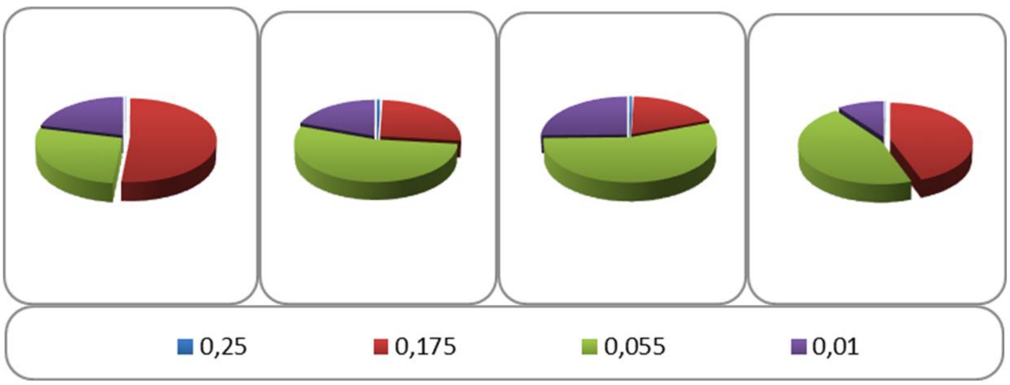
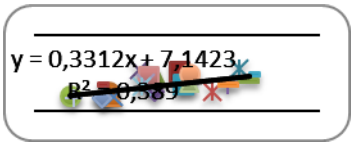
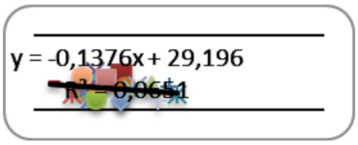
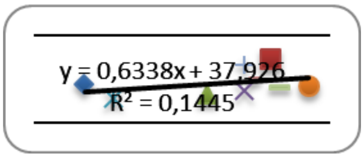
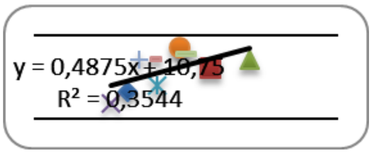
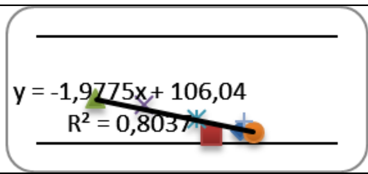
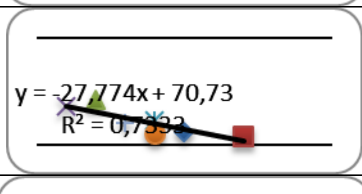
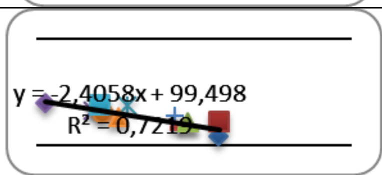
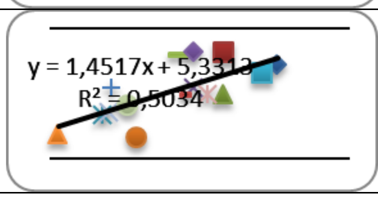



**Fig. 3.** Distribution of fractions in groups of rocks (from left to right): clay-aleuritic sand, clay-sandy siltstones, sandy-clayey siltstone and clayey sandy loam

***Table 2***

The effect of fractional content on the porosity in various types of rocks

<table>
<tr><th>Rock groups</th><th>Size of grains, мм</th><th>Dependency of porosity on fractions content</th><th>Graf forms of dependency</th></tr>
<tr><td rowspan="2">Clay-aleuritic sands</td><td>0.175</td><td>Y=0.3312X+7.14</td><td>
</td></tr>
<tr><td>0.055</td><td>Y=-0.1376X+29.196</td><td>
</td></tr>
<tr><td rowspan="2">Clay-sandy siltstones</td><td>0.055</td><td>Y=0.6338X+37.926</td><td>
</td></tr>
<tr><td>0.175</td><td>Y=0.4875X+10.75</td><td>
</td></tr>
<tr><td rowspan="2">Sandy-clayey siltstone</td><td>0.055</td><td>Y=-1.9775X+106.04</td><td>
</td></tr>
<tr><td>0.25</td><td>Y=-27.774X+70.73</td><td>
</td></tr>
<tr><td rowspan="2">Clayey sandy loam</td><td>0.055</td><td>Y=0.3312X+7.14</td><td>
</td></tr>
<tr><td>0.175</td><td>Y=0.3312X+7.14</td><td>
</td></tr>
</table>

We also tried to calculate the average particle diameters and fractality indices for the above-described rock groups using the formula:

$$\frac{1}{d_{cp}} = \frac{1}{2}\left(\frac{1}{d_{n1}} + \frac{1}{d_{n2}}\right)$$

where $d_{cp}$ – the average grains diameter; $d_{n1}$ – diameter n1 grains; $d_{n2}$ – n2 grains diameter.

The results of the calculations are shown in Fig. 4 which reflects the effect of the fractality index on oil saturation and the correlation equation describing this effect. The rather high correlation coefficient (R>0.8) of the obtained power dependence indicates the confidence level of the closeness of the relationship between oil saturation and the fractality index.

***Table 3***

Paired correlation coefficients between fractions and parameters that average the grain size distribution and reflect the sorting of rocks (title of the parameters, see the text)

| Parameters | | Grain size, мм | | | | | | Indicators | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F1 | F2 | F3 | F4 | F5 | F6 | Md | ВЗП | Ksorт | So | Hr | Mf |
| | | 1-0.5 | 0.5-0.25 | 0.25-0.1 | 0.1-0.05 | 0.05-0.01 | < 0.01 | | | | | | |
| Indicators | **Mf** | -0.07 | -0.17 | -0.32 | -0.67 | -0.27 | -0.85 | -0.5 | 0.56 | 0.22 | 0.27 | -0.93 | |
| | **Hr** | 0.15 | 0.27 | 0.47 | 0.71 | 0.03 | 0.86 | 0.58 | 0.7 | -0.7 | -0.24 | | |
| | **So** | 0.07 | 0.06 | -0.48 | -0.46 | 0.09 | 0.61 | -0.73 | -0.54 | 0.97 | | | |
| | **Ksorт** | 0.08 | 0.07 | -0.35 | -0.38 | 0.007 | 0.5 | -0.61 | -0.41 | | | | |
| | **ВЗП** | 0.24 | 0.3 | 0.91 | 0.51 | -0.39 | -0.81 | 0.93 | | | | | |
| | **Md** | -0.007 | 0.08 | 0.9 | 0.53 | -0.35 | -0.83 | | | | | | |
| Grain size, мм | (F6) < 0.01 | -0.03 | -0.12 | -0.62 | -0.75 | -0.05 | | | | | | | |
| | (F5) 0.05-0.01 | 0.008 | -0.04 | -0.49 | -0.22 | | | | | | | | |
| | (F4) 0.1-0.05 | -0.04 | 0.02 | 0.25 | | | | | | | | | |
| | (F3) 0.25-0.1 | -0.009 | 0.09 | | | | | | | | | | |
| | (F2) 0.5-0.25 | 0.57 | | | | | | | | | | | |
| | (F1) 1-0.5 | | | | | | | | | | | | |

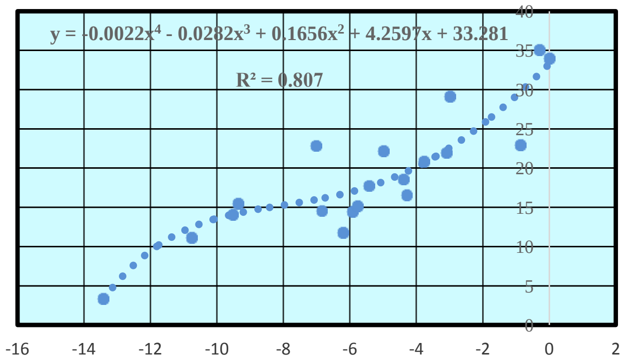



**Fig. 4.** Dependence of oil saturation of reservoirs on the fractality index

## Conclusions

As a result of generalization of statistical estimates of the degree of influence of individual fractions (including the dominant ones) on the level of porosity in various types of reservoir rocks the following was established:

1. In clay-aleuritic sands an increase in the content of the dominant fraction (0.175 mm) leads to an increase in porosity, while an increase in the content of the fraction with a grain size of 0.055 mm reduces the porosity in this group of rocks. For the remaining selected groups of rocks (clay-sandy siltstone, sandy-clayey siltstone and clayey sandy loam) the fraction with a grain size of 0.055 mm was dominant with a different ratio of fractions of 0.175 and 0.01 mm. Here just as in the first group of rocks the fraction of coarse grains (0.25 mm) makes up an insignificant part of the volume and was not taken into account.

2. In clay-sandy siltstone an increase in the content of both, the dominant fraction and the fraction of 0.175 mm, leads to an increase in porosity, and in the group of sandy-clayey siltstone has negative character.

3. In clayey sandy loams the influence on the porosity of the dominant (fine grains 0.055 mm) and subordinate fraction (coarser grains 0.175 mm) as in the group of clay-aleuritic sands has the opposite character. Thus, an increase in the content of the fine (dominant 0.055 mm) fraction in clayey sandy loams leads to a decrease in porosity, while an increase in the content of the coarser fraction (0.175 mm) increases the porosity.

4. As a result of calculations the relationship between the fractality index and oil saturation was determined, a functional relationship between oil saturation and the fractality index was also obtained. This function can be used in planning work related to the additional processing of deposits that are in the final stage of exploitation.

**REFERENCES**


Bjorlykke K. Clay mineral diagenesis in sedimentary basins; a key to the prediction of rock properties. Examples from the North Sea Basin. Clay Minerals, V. 33, No.1, 1998, pp. 15-34.

Hasanov A.B., Mamedova D.N., Abbasov E.Y. Geological and geophysical study of the PT section of the South Caspian depression (some issues of the predictive assessment of the sedimentary complex). Lambert Academic Publishing. Moscow, 2017, 109 p. (in Russian).

Holcomb D., Rudnicki J.W., Issen K.A., Sternlof K. Compaction localization in the Earth and laboratory: State of the research and research directions. Acta geotechnica, 2007, V. 1, No. 2, pp.1-15.

Issen K.A., Challa V. Influence of the intermediate principal stress on the strain localization mode in porous sandstone. J. Geophysical Research, V. 113, 2008, B02103, DOI:10.1029/2005JB004008.

Lade P.V. Overview of constitutive models for soils. In: Soil Constitutive Models: Evaluation, Selection, and Calibration (ed. by J.A. Yamamuro, V.N. Kalaikin). ASCE Geotech. Spec. Publ., V. 128, 2005, pp. 1-34.

Levchuk M.A., Bukreeva G.F. On the sorting of terrigenous sediments and values averaging the particle size distribution. Geocyclicity. IGiG. Novosibirsk, 1976, 215 p. (in Russian).

Marcussen O., Thyberg B.I., Peltonen C., Jahren J., Bjorlykke K., Faleide J.I. Physical properties of Cenozoic mudstones from the northern North Sea: Impact of clay mineralogy on compaction trends. AAPG Bulletin, V. 93, 2009, pp. 127-150.

Mollema O.N., Antonellini M.A. Compaction bands: A structural analog for anti-mode I cracks in aeolian sandstone. Tectonophysics, V. 267, 1996, pp. 209-228.

Mondol N.H., Bjorlykke K., Jahren J., Hoeg K. Experimental mechanical compaction of clay mineral aggregates – changes in physical properties of mudstones during burial. Marine and Petroleum Geology, V. 24, No. 5, 2007, pp. 289-311.

Muir Wood D. Soil behaviour and critical state soil mechanics. Cambridge: Cambridge University Press. 1991, 488 p.

Romanovsky S.I. Application of information theory to solve some problems of lithology. Mathematical methods in geology. Leningrad, VSEGEI, 1968, pp. 75-92 (in Russian).

Zapivalov N.P., Smirnov G.I., Kharitonov V.I. Fractals and nanostructures in oil and gas geology and geophysics. Geo. Novosibirsk, 2009, 130 p. (in Russian).


**ЛИТЕРАТУРА**


Bjorlykke K. Clay mineral diagenesis in sedimentary basins; a key to the prediction of rock properties. Examples from the North Sea Basin. Clay Minerals, V. 33, No. 1, 1998, pp. 15-34.

Holcomb D., Rudnicki J.W., Issen K.A., Sternlof K. Compaction localization in the Earth and laboratory: State of the research and research directions. Acta geotechnica, 2007, V. 1, No. 2, pp.1-15.

Issen K.A., Challa V. Influence of the intermediate principal stress on the strain localization mode in porous sandstone. J. Geophysical Research, V. 113, 2008, B02103, DOI:10.1029/2005JB004008.

Lade P.V. Overview of constitutive models for soils. In: Soil Constitutive Models: Evaluation, Selection, and Calibration (ed. by J.A. Yamamuro, V.N. Kalaikin). ASCE Geotech. Spec. Publ., V. 128, 2005, pp. 1-34.

Marcussen O., Thyberg B.I., Peltonen C., Jahren J., Bjorlykke K., Faleide J.I. Physical properties of Cenozoic mudstones from the northern North Sea: Impact of clay mineralogy on compaction trends. AAPG Bulletin, V. 93, 2009, pp. 127-150.

Mollema O.N., Antonellini M.A. Compaction bands: A structural analog for anti-mode I cracks in aeolian sandstone. Tectonophysics, V. 267, 1996, pp. 209-228.

Mondol N.H., Bjorlykke K., Jahren J., Hoeg K. Experimental mechanical compaction of clay mineral aggregates – changes in physical properties of mudstones during burial. Marine and Petroleum Geology, V. 24, No. 5, 2007, pp. 289-311.

Muir Wood D. Soil behaviour and critical state soil mechanics. Cambridge: Cambridge University Press. 1991, 488 p.

Гасанов А.Б., Мамедова Д.Н., Аббасов Э.Ю. Геолого-геофизическая изученность разреза ПТ Южно-Каспийской впадины (некоторые вопросы прогнозной оценки осадочного комплекса). Lambert Academic Publishing. Москва, 2017, 109 с.

Запивалов Н.П., Смирнов Г.И., Харитонов В.И. Фракталы и наноструктуры в нефтегазовой геологии и геофизике. Гео. Новосибирск, 2009,130 с.

Левчук М.А., Букреева Г.Ф. О сортированности терригенных осадков и величинах, усредняющих гранулометрический состав. Геоцикличность. ИГиГ. Новосибирск, 1976, 215 с.

Романовский С.И. Применение теории информации для решения некоторых задач литологии. Математические методы в геологии. Ленинград, ВСЕГЕИ. 1968, с. 75-92.


## СТОХАСТИЧЕСКИЙ ХАРАКТЕР РАСПРЕДЕЛЕНИЯ ГРАНУЛОМЕТРИЧЕСКОГО СОСТАВА И ФРАКТАЛЬНОСТЬ ПОРОВОЙ СТРУКТУРЫ НЕФТЕНОСНЫХ КОЛЛЕКТОРОВ


**Гурбанов В.Ш.[1], Гасанов А.Б.[2], Аббасова Г.Г.[2]**

[1]*Институт нефти и газа, Национальная Академия Наук Азербайджана*
*AZ1000, Азербайджан, г. Баку, ул. Ф.Амирова, 9*
[2]*Азербайджанский государственный университет нефти и промышленности*
*AZ1010, Азербайджан, г. Баку, пр. Азадлыг, 20*
*adalathasanov@yahoo.com*



***Резюме.*** Известно, что основные нефтяные пласты расположены в терригенных осадочных породах, представляющих собой структурированную матрицу с текстурно организованным поровым пространством. В свою очередь, типичная структурированная матрица состоит из минеральных зерен различных размеров, которые выглядят как хаотические системы. В данной статье дан подробный аналитический обзор результатов анализа размеров зерен керна из скважин одного из известных нефтяных месторождений в Азербайджане. Исследования охватывали наиболее типичные для региона продуктивные горизонты, содержащие пелитовые, алевритовые, мелкозернистые и среднезернистые песчаные фракции. Результаты изменения содержания фракций в зависимости от глубины представлены в виде круговых диаграмм и графиков изменения пористости в зависимости от фракционного состава и механического уплотнения осадков. Расчет парного коэффициента корреляции между фракциями и параметрами, усредняющими распределение частиц по размерам и отражающими сортировку горных пород, показал, что они независимы и не связаны какими-либо функциями.

В то же время влияние отдельных фракций, а главное их соотношения, на величину межзерновой пористости неравномерно. Детализация процесса моделирования мультимодального распределения показала, что при этом более эффективно использование фрактальных концепций. В связи с этим для оценки коллекторских свойств нефтеносных пород альтернативно была рассчитана зависимость между индексом фрактальности и нефтенасыщенностью.

***Ключевые слова:*** *межзерновая пористость, терригенные коллекторы, упаковка зерен, показатель фрактальности, гранулометрический анализ, доминирующие фракции*

## NEFT TUTUMLU KOLLEKTORLARIN MƏCAMƏLİ STRUKTURUNUN FRAKTALLIĞI VƏ QRANULOMETRİK TƏRKİBİNİN STOXASTİK PAYLANMASI XARAKTERİ

**Qurbanov V.Ş.[1], Həsənov A.B.[2], Abbasova G.G.[2]**
*[1]Azərbaycan Milli Elmlər Akademiyasının Neft və Qaz İnstitutu*
*AZ1000, Azərbaycan, Bakı ş., F.Amirov küç., 9*
*[2]Azərbaycan Dövlət Neft və Sənaye Universiteti*
*AZ1010, Azərbaycan, Bakı ş., Azadlıq prosp., 20*

***Xülasə.*** Məlum olduğu kimi, əsas neftli laylar məsaməli boşluğa malik strukturlaşdırılmış matrisli terrigen çökmə süxurlarında təsadüf edir. Öz növbəsində, tipik quruluşlu matris, xaotik sistemlərə bənzəyən müxtəlif ölçülü mineral dənələrdən ibarətdir. Təqdim olunmuş məqalədə Azərbaycanın tanınmış neft yataqlarından birinin quyularından alınmış kern nümunələrinin qranulometrik analizi nəticələrinin ətraflı analitik icmalı təsvir edilmişdir. Tədqiqatlar bölgə üçün ən tipik məhsuldar horizontların, pelitli, alevritli, incə - və ortadənəli qum fraksiyalarını əhatə etmişdir. Dərinliyə görə fraksiyaların tərkibinin dəyişkənliyinin nəticələri dairəvi diaqramlar və çöküntülərin fraksiya tərkibindən və mexaniki sıxılmasından asılı olaraq məsaməliyin dəyişikliklərinin qrafiklər şəklində təqdim olunur. Dənələrin ölçülərinin paylanması və süxurların çeşidlənməsini əks etdirən fraksiyalar və parametrlər arasındakı cüt korrelyasiya əmsalının hesablanması müstəqil olduqlarını və heç bir funksiya ilə əlaqəli olmadığını göstərdi.

Eyni zamanda fərdi fraksiyaların təsiri və ən əsası dənələrarası məsaməliyin pay nisbətinin qeyri-bərabər olduğu müəyyən edildimişdir. Multimodal paylanma modelləşdirmə prosesi ətraflı şəkildə göstərdi ki, bu məsələdə fraktal anlayışların istifadəsi daha səmərəlidir. Bu baxımdan, neft tutumlu kollektorların xüsusiyyətlərini qiymətləndirmək üçün, alternativ olaraq, fraktal göstəricisi və neft doyumluğu arasındakı asılılıq funksiyası hesablanmışdır.

***Açar sözlər:*** *interqranular məsaməlik, terrigen kollektorlar, dənələrin qablaşdırılması, fraktallıq göstəricisi, dənələrin ölçüsünün təhlili, dominant fraksiyalar*