

SCIENTIFIC AND ORGANIZATIONAL REPORT
of the "Fluid Mechanics" department
for the first half of 2021

Topic: **"Development of theoretical and applied foundations of non-stationary, non-equilibrium processes under the simultaneous flow of heterogeneous systems"**

During the reporting period, scientific research was carried out in accordance with the schedule of scientific and technical work of the department.

Within the framework of the stated topic, studies were conducted to assess the stability criteria that arise in heterogeneous systems of different densities, to develop practical foundations for flow and filtration processes with consideration of various structural forms for expanding the scope of application in displacement processes in porous media.

The influence of the physico-chemical characteristics of liquid mixtures on the flow properties is estimated, the features of the interaction of fluids in a porous medium with different densities are investigated and statistical models are constructed.

During the reporting period, two articles were published, five articles were accepted for publication, one article was prepared and submitted for publication:

A patent for inventions of the Azerbaijan Republic was obtained: № a2019 0119 Panakhov G.M., Abbasov E.M. "Dry mixture for isolation of highly permeable reservoir intervals for reservoir conformance control".

The next issue of Transactions of ANAS (Mechanics issue) No. 8, Vol. 40, 2021 has been published.

Corresponding member of ANAS Geylani Panakhov supervised the research works of 3 dissertants and 1 master's student. The researcher of the Department Parviz Museibli completed the PhD dissertation and presented it to the Higher Attestation

Commission. Ibragim Mammadov, a master's student of the Department, successfully passed the entrance exams to the doctoral program.

Corresponding member of ANAS Geylani Panakhov, doctor of technical sciences Yasin Rustamov and candidate of technical sciences, associate professor Eldar Abbasov participated in teaching a course of various disciplines for masters and bachelors at IMM and BSU.

During the reporting period, corresponding member of ANAS Geylani Panakhov participated as the chairman of the State Examination Commission of Baku State University in the final defense of diplomas, under his leadership, the master's degree of the department "Theoretical Mechanics and Continuum Mechanics" was defended.

During the reporting period, the department's employees conducted a field operation in the BinagadyOil oil company aimed at intensifying oil production at production well No. 210127 using the department's developments.



Photo 1. Commercial implementation of scientific research - Binagadi Oil Company, Baku

Corresponding member of ANAS Panahov G.M. and associate professor Abbasov E.M. took part in an operational meeting on June 11, 2021 in the "Gas Export Department", held by SOCAR on the basis of the protocol approved by SOCAR Vice President for Oil and Gas Production and Transport Iskenderov D. for solving technological problems arising on the Hajigabul – Gazi-Magomed main pipeline. It was decided to use special viscoelastic compositions developed in the department in the field conditions and preparatory work was carried out.

Scientific publications prepared during the reporting period:

1. Panahov, G.M., Abbasov, E.M. & Jiang, R. *The novel technology for reservoir stimulation: in situ generation of carbon dioxide for the residual oil recovery*. J Petrol Explor Prod Technol (2021). <https://doi.org/10.1007/s13202-021-01121-5> - published.

2. Geylani M. Panahov, Afet O. Yuzbashiyeva, Elnara F. Mamedova, Ibrahim J. Mamedov, *Ground consolidation under the fractal filtration law // ANAS Transactions (issue Mechanics), Vol. 40, № 7, 2021. – pp. 22-29. - published.*

3. Rustamov Y., Yanqaliyeva A. «*Forcing the system by adrift*» submitted in the // Journal Matematychni Studii. 2021, 55, 2. – accepted.

4. Guliyev V., Rustamov Y., Gadjiyev T. *The regularity of solutions higher-order nondivergence elliptic equations with VMO coefficients in Orlicz-Morrey spaces. - ICMSEM 2021. – accepted.*

5. Azizaga Kh. Shakhverdiev, Geylani M. Panahov, Renqi Jiang, Eldar M. Abbasov *In-situ CO₂ generation technology as the method for residual oil recovery // Journal of Petroleum Science and Technology, Taylor and Francis – accepted.*

6. Geylani M. Panahov, Eldar M. Abbasov, Sayavur I. Bakhtiyarov, Parviz T. Museibli *An effect of electrokinetic phenomena on nonlinear wave propagation in bubbly liquids // International Journal of Applied Mechanics and Engineering, Sciendo Publ. – presented to the Journal.*

7. Geylani M. Panahov, Eldar M. Abbasov, Shahin Z. Ismayilov and Vusale D. Balakchi *In-depth isolation of highly permeable zones for reservoir conformance control* // Journal of Dispersion Science and Technology, Taylor and Francis Group – presented to the Journal.

Department head,
corresponding member of Azerbaijan NAS

Geylani Panahov