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COMPUTATION OF GAS MICROFLOW IN CORE CAPILLAR

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The study of the properties of hydrocarbon layers is of great importance for the subsequent development and exploitation of deposits. One of the effective technologies for such studies is the experimental analysis of rocks with the help of excavation of special samples – cores.

To date, a bank of such samples all over the world significantly exceeds the capabilities of the research experimental base. In this regard, technology "digital core" has appeared, which allows replacing most of the experimental studies with computer simulation. In addition, this new technology allows you to extract more information from digitized samples than a specific field experiment.

For the effective use of technology "digital core" it is necessary to develop a base of mathematical models. By now, many heuristic, continual, stochastic, etc. models of different quality and resolution have been created. However, an adequate conformity of the physics of the stratums in the mathematical models of cores has not yet been achieved.

Many authors recognized that the achievement of a good quality is in the field of creating the multiscale multiphysical mathematical models, including models based on ab initio principles. One such approach is the direct molecular modeling of fluid flows in capillaries of cores. In the paper, this approach is applied to computing the flow of the gas phase of a hydrocarbon fluid in a capillary. The developed computer technology allowed to investigate this process and put the obtained results into the basis of the multiscale model developed earlier [1].

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REFERENCES

[1] V.O. Podryga, S.V. Polyakov, and D.V. Puzyrkov, Supercomputer simulation of nonlinear problems of fluid dynamics in cores. *Lobachevskii J. Math.*, Vol. **38**(5), pp. 958–963, 2017.