Brief information about the project

Title	AP22688606 «Using machine learning methods to solve the problem of predicting oil production» (0124PK00223)
Relevance	Deep learning methods have demonstrated success in supervised learning tasks where access to extensive labeled data is available. However, in the field of modeling multiphase fluid flow in porous media for reservoirs, there are limitations due to the complexity of physical processes and uncertainties in data. Therefore, it becomes crucial to develop effective learning methods that incorporate physical laws and prior information in the form of constraints. The concept of physics-informed neural networks (PINN) proposes training neural networks considering physical laws, aiming to reduce dependence on extensive data. This model is designed to minimize the residuals of partial differential equations, reflecting the principles of physical informativeness.
Goal	The objective of this project is to investigate the impact of polymer flooding and temperature effects on solving the problem of oil displacement using machine learning methods.
Tasks	To achieve the goals of this project, the following tasks are planned: 1) Numerical simulation of two-phase flow model in porous media. 2) Development of predictive model of two-phase flow model with PINN. 3) Numerical simulation of polymer flooding model. 4) Development of a predictive model of water and polymer flooding with PINN. 5) Numerical simulation of polymer flooding model taking into account temperature effects. 6) Development of a predictive model of water and polymer flooding with PINN taking into account temperature effects.
Expected and Achieved Results	- Numerical simulation of a two-phase flow model in a porous media implemented. - A predictive model of two-phase flow model with PINN developed. - The results of the numerical solution and PINN for a two-phase flow model in a porous media analyzed. - Numerical simulation of polymer flooding model will be implemented. - A predictive model of water and polymer flooding with PINN will be developed. - The results of the numerical solution and PINN for a two-phase flow model in a porous media will be analyzed. - Numerical simulation of polymer flooding model taking into account temperature effects will be implemented. - A predictive model of water and polymer flooding with PINN taking into account temperature effects will be developed.

	- The results of the numerical solution and PINN for model of water and polymer flooding taking into account temperature effects will be analyzed.
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