Features of the self-oscillating mode of fluid filtration in porous media

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Filtration processes for two-phase fluids (hydrocarbon mixtures, steam-water mixture) in porous media can be unsteady. Of particular interest are the so-called self-oscillating filtration modes in which stable fluctuations of the fluid flow rate are observed under constant boundary conditions. Such modes are recorded both in the course of bench experiments [1] and in mathematical modeling of unsteady two-phase filtration [2]. The emergence of such filtration can have a complex mechanism associated, among other things, with the lack of thermodynamic equilibrium in the zones of phase transformations [3]. The assumption of local thermodynamic equilibrium is characteristic of many mathematical models used to simulate the processes of unsteady filtration in porous media. However, the applicability of this assumption is questionable. It is possible to solve this problem by developing a mathematical model that takes into account the nonequilibrium processes. The development of methods for modeling non-stationary filtration can be of practical importance, since in the long term it would allow more efficient exploitation of gas condensate fields and sources of geothermal energy.

[1] Zaichenko V, Molchanov D and Torchinskiy V 2016 *J. Phys.: Conf. Ser.*
[2] Sokotushenko V, Torchinsky V and Ivanin O 2020 *Oil Industry* 119–123
[3] Bulejko V 2007 Zakonomernosti fazovyh prevrashchenij uglevodorodnyh smesej v neftegazonostnyh plastah razrabatyvaemyh mestorozhdenij (po eksperimental'nym dannym): Diss. ... dokt. tekhn. nauk