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Mathematical modeling heat and mass transfer processes in porous media DARKHAN AKHMED-ZAKI, al-Farabi Kazakh National University — On late development stages of oil-fields appears a complex problem of oil-recovery reduction. One of solution approaches is injecting of surfactant together with water in the form of active impurities into the productive layer – for decreasing oil viscosity and capillary forces between "oil-water" phases system. In fluids flow the surfactant can be in three states: dissolved in water, dissolved in oil and adsorbed on pore channels' walls. The surfactant's invasion into the reservoir is tracked by its diffusion with reservoir liquid and mass-exchange with two phase (liquid and solid) components of porous structure. Additionally, in this case heat exchange between fluids (injected, residual) and framework of porous medium has practical importance for evaluating of temperature influences on enhancing oil recovery. Now, the problem of designing an adequate mathematical model for describing a simultaneous flowing heat and mass transfer processes in anisotropic heterogeneous porous medium –surfactant injection during at various temperature regimes has not been fully researched. In this work is presents a 2D mathematical model of surfactant injections into the oil reservoir. Description of heat- and mass transfer processes in a porous media is done through differential and kinetic equations. For designing a computational algorithm is used modify version of IMPES method. The sequential and parallel computational algorithms are developed using an adaptive curvilinear meshes which into account heterogeneous porous structures. In this case we can evaluate the boundaries of our process flows – fronts ("invasion", "heat" and "mass" transfers), according to the pressure, temperature, and concentration gradient changes.

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