WIERTNICTWO NAFTA GAZ • TOM 24 • ZESZYT 1 • 2007

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MODELING OF RESERVOIR PROCESS USING THE METHOD OF RADIAL DRILLING

At present, a number of methods of improvement of reservoir recovery are well--known [1–4]: 1) thermal method of effect on productive horizon [1–3]; 2) formation hydro-breakdown and application of combustible gas energy for organizing of blast in a borehole [4]; 3) acid treatment of wellbottom zone etc. [1]. The most common is the first method, which maintains not only producing energy, but due to improvement of rheological characteristics increases oil fluidity [1–3]. However, this method is applied with large consumption of facilities at pumping and heating of heat carriers [2, 3]. Hydro-breakdown with application of combustible gas energy reqires delicate management and may lead to uncontrolled process that is fraught with dangerous situations [4]. The third method generally is suitable for bottomhole formation zone [1]. The method of radial drilling, when reservoirs with high permeability are made for oil withdrawal from strata with low conductive characteristics and extensive dimensions (of high thickness) – is one of effective methods improvement of reservoir recovery. This task is of large interest due to involving in treatment strata with complicated geological structure and for rehabilitation of deposits with abnormal rheological characteristics of oil. The problem is to determine interaction of low-permeable bank of high thickness with high-permeable reservoir, produced by radial drilling method, and find required oil withdrawal for rational exploitation of deposit.

The Report presents results of calculation-theoretical study of reservoir recovery using the method of radial drilling.

1. Mathematical model of oil filtration in the bed with high-permeable reservoir, formed in the result of radial drilling, has been developed. High-permeable reservoir represents itself porous medium with filtration characteristics, much exceeding coefficients

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of permeability of ambient block of high power. In high-permeable reservoir pressure decreases due to fluid withdrawal that leads to fluid influx from ambient low-permeable block. Using representation of mechanics of interpenetrating continuums the process may be described by single equation with different filtration characteristics [5]. Generalized mathematical model of filtration allows automatically meeting conditions of continuity of pressure and mass flows when passing the interface of porous mediums.

2. Obtained calculation data of pressure field and velocity vector illustrate the picture of filtration flow, regularities of interaction between porous block and high-permeable reservoir, and value of fluid influx through the interface depend upon order parameters.
3. The developed mathematical model allows assessing ratios of coefficients of permeability, piezoconductivity of the block and high-permeable reservoir, required for optimal consumption of withdrawing fluid for efficient development of the field with low permeability and higher power.

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