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Content

ON THE DIRECT AND INVERSE PROBLEM OF THE THEORY OF FILTRATION ON SPECIFICATION OF TECHNOLOGICAL INDICATORS

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The work is devoted to the investigation of the problem of pressure refinement in the areas of power supply and unloading and identification of technological indicators in the near-well zone of the formation. Concentration of transfer of individual components can be described by the equation of convective diffusion

$$mS_r\frac{\partial C_r}{\partial t}+\overset{\rho}{v_r}\nabla C_r-D_r\nabla^2 C_r=0 \tag{1}$$

D_r - coefficient of dispersion, calculated by the formula

$$D_r=D_0[\frac{1}{F^*m}+0.5\frac{\vec{U_r}d_p\sigma}{mD_0}]^n;\overset{\rho}{U_r}=-\frac{K_r(x,y)}{\mu_r}\nabla P_r \tag{2}$$

The filtration of a multicomponent mixture is described by a system of equations

$$div\rho_r h\overset{\rho}{U_r}+mhS_r\frac{\partial\rho_r}{\partial t}+q_r=0 \tag{3}$$

$$div\rho_r hC_i h\overset{\rho}{U_r}+mhS_r\frac{\partial\rho_r C_i}{\partial t}+q_r C_i=0;i=1,n;\rho_r=\rho_0\frac{\rho_r T_0}{\rho_0 T_z} \tag{4}$$

$$\sum_{i=1}^{n}C_i=1 \tag{5}$$

The initial conditions are

$$T=T_0;p_r=p_0(x,y,t);C_i=C_{i0}(x,y,t);i=i,n-1 \tag{6}$$

The boundary conditions are as follows

$$F(x,y)=0;f(p_r\frac{\partial P_r}{\partial n},x,y,t)=0;C_i=C_{ir}(x,y,t)=0;i=1,n-1 \tag{7}$$

The direct problem of convective diffusion consists in finding functions P_r and C_i, satisfying equations (4) - (5), the initial conditions, the boundary conditions. The functions $q_r(x,y,t)$, $k_r(x,y)$, $m(x,y)$ and $h(x,y)$ are assumed to be given. The inverse problem for convective diffusion can be in determining the parameters k_r, m and h satisfying equations (4) - (11) if the data are known $P_r(x,y,t)$ and $C_i(x,y,t)$ in a certain part of the filtration area at certain points in time. Numerical experiments with real data were carried out.