HYDRODYNAMIC CALCULATION OF JOINT WORK AND BARREL GAS WELLS BOTTOMHOLE FORMATION ZONE IN THE PRESENCE OF A LIQUID PHASE

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Abstract. *Gas industry of Uzbekistan is planned to increase gas production to 60 billion. m^3. To perform this task, along with the development of major new fields of research are related to the ability to maximize the performance of each individual well, which would reduce the cost of production of gas. A necessary condition for the increase of gas production from the well is to obtain reliable information about the possibilities of gas recovery beds.*
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In the operation of wells in the gas flow in the "reservoir-slaughtering-estuary" Well, what a plantar, outline water, loss of hydrocarbon gas and condensate from condensing in the trunk and face zone creates additional resistance.

When gas flow rates that do not provide a complete removal of the liquid from the bottom to the surface, there is a process of accumulating it in the trunk, which creates pressure on the producing formation, significantly affect the gas production. This leads to a decrease in flow rates disabling lower productive reservoir intervals from work. It should be noted that in the past in connection with the introduction of the development of new gas and condensate field with sharply heterogeneous reservoirs, especially in carbonate rocks, the problem of dealing with fluid in the trunk and on the bottom of the well is of great importance. Despite the large number of available works devoted to the exploitation of gas and gas condensate wells in the presence of a liquid phase, to date, there are studies on the nature of the impact of the liquid in the barrel in the producing formation.

Therefore the study of the nature of the impact of the terms of the inflow of liquid gas in the "seam-slaughter-mouth" is one of the urgent problems of production, and taking into account that the decision in the course of operation of wells help reduce unproductive losses of pressure and extract additional gas resources. In this paper, based on the solution of problems on the motion of the gas-liquid mixture in a vertical pipe, taking into account the inflow of gas to the bottom of the well is determined by the distribution of the hydrodynamic characteristics of the flow speed, flow, pressure in the range of perforations. The results of this work can be used in establishing the necessary technological modes of operation of wells.

Formulation of the problem

Let there be a well operating a gas-bearing reservoir capacity of 100 meters of constant permeability. At the bottom there is a seam gas reservoir from which water flowed.

Since the study marginally well, it takes a constant flow rate of water. The well communicates with the reservoir through the perforations. The inflow of gas and water to the well carried out separately. The well is flowing gas-liquid mixture.

The liquid located in the trunk creates a pressure on the individual reservoir intervals. Required to quantify the influence of the liquid column in the trunk of the terms of the inflow of gas to the well over the entire interval of the formation, ie, distribution of flow rate of gas in power.

This will determine the operating range of the reservoir and to establish the optimal technological mode of operation of gas wells in the presence of liquid products. Mathematical this task can write a system of equations describing the flow of gas from the reservoir to the wellbore and gas-liquid flow in the trunk.

Hydrodynamic calculation of the well will produce from the mouth to the face. Variable is the pressure in the well.

The structure of the gas-liquid flow.

The flow of gas-liquid systems in the tubes is characterized by a variety of forms and patterns of currents. Flow structure have a significant role in the density of the gaseous and liquid phases.

Therefore, each structure has its own flow of empirical formula for determining the values of α, β to be aware of when calculating the hole.

When the liquid-gas wells as a result of changes in the length of its pressure and flow rate may occur 5 major types of flow structure.

1. Ring during arises whenever $\hat{W} > 0,845$. In the coordinate system β, $\hat{W}$ it is located within the area of the upper limit of which $\beta = 1$. A lower

$$\beta_{g\kappa}=\frac{1+0,2(0,06+\rho)^{1/2}\,\hat{W}^{-2}}{1+0,28(0,06+\rho)^{1/2}}. \tag{1}$$

2. Dispersed-annular flow

After the formation of the annular flow and a further increase in the gas velocity and the wave surface of the liquid film breaks down the liquid and carried away in the flow core. Such flow is called dispersion-ring or rod.

By definition, the existence region of the dispersed-annular flow is an extension of the area of the annular flow. The boundary between these structures is determined by the beginning of the breakdown of droplets on the surface of the film. A clear distinction between these tendencies are observed. Slight disruption zero drops begins immediately after the formation of the annular flow.

Approximately region of existence of dispersed-annular flow can be determined within the limits of:

$$\beta g\kappa < \beta < 1 \ (\hat{W} \geq 2). \tag{2}$$

3. **The bubble flow**. When the bubble during the gas phase in the form of bubbles distributed in the continuous liquid flow This structure is typical of the flow of carbonated oil wells. Falling pressure adjustment hole causes degassing of oil, increase in the number of bubbles and their size. The latter, in addition to reducing the pressure is due to an agglomeration of randomly moving bubbles. For these reasons, during the bubble tends to go to the cork.

Recent studies have shown that the structure of the bubble depends on the input conditions of the mixture into a well, and therefore difficult to define the boundaries of its existence. The area is limited to bubble over.

$$B = 1, (\hat{W} < 0{,}845). \tag{3}$$

4. Slug flow.

Thus during the transverse dimension of the gas bubbles becoming comparable to the diameter of the pipe.

Bubbles have a characteristic 'shell' form and follow each other at a certain distance. After the bubble produced a series of fine bubbles. With increasing pressure, the distance between the bubbles decreases. And their transverse size remains the same.

Such flow can occur in the condensate and in some cases in the oil and gas wells. In the plane β, $\hat{W}$ upper boundary of the existence of slug flow is determined by the equations.

$$\beta n = 2\beta g\kappa - 1 \ (\hat{W} > 0{,}845). \tag{4}$$

5. Cork-foam annular flow.

The transition from slug flow to the ring associated with the transition through the mode of "flooding" and reverse. Between these modes, the liquid phase becomes unstable. At relatively low velocities mixture loss of stability of the liquid film is responsible for the formation of liquid bridges and the emergence of a cork-annular flow. For large values of its buckling liquid phase leads to the destruction puzyrey- "caps" and the formation of gas inclusions atypical species, ie the emergence of foam flow.

Cork-ring over there in the field:

$$\beta n < \beta < \beta g\kappa \ (0{,}845 < \hat{W} < 2). \tag{5}$$

Distribution existence of foam flow is limited by the same values of β, but other velocities mixture, ie

$$\beta n < \beta < \beta g\kappa \ (\hat{W} > 2). \tag{6}$$

Workaround:

To calculate the well from the mouth to the soles divide it into 2 Participation: Z1 and Z2

We write the differential equations describing the two-phase flow in vertical pipes with respect to oil and gas wells

$$-\frac{dp}{dz} = g[\rho_1(1-\varphi) + \rho_2\varphi]\frac{\lambda W^2 cp}{2Dg}[\rho_1(1-\beta) + \rho_2\beta] + [(1-\varphi) + \rho_1 W^2_1 \varphi\rho_2 W^2_2] \tag{7}$$

g-gravitational acceleration.

ρ_1 and ρ_2-density liquid

φ- true gas content of the mixture in the cross section is determined on the basis of experimental data [3].

$\varphi = \beta$

Where

β = expenditure on gas content

Qg- gas flow;

Qzh - flow rate;

λ-coefficient of friction;

λ_0-coefficient for single-phase current;

Wsp = mixture.

The left side of equation (7) full pressure gradient. The first term in the right particle pressure gradient caused by the force of gravity, the second frictional force, the third is the change of momentum of the mixture.

When driving oil and gas condensate mixtures in wells third term by about one to two orders of magnitude than any of the first two terms. Therefore, in some cases it can be ignored. The critical flow rate characterizes the direction of flow of the gas-liquid mixture "reverse" and is determined from the experimental data

$$Wkr = K(\mu)^{1/4}. \qquad (8)$$

Here K (μ) - dimensionless function depending on the ratio of the dynamic viscosity of the liquid phase.

g-acceleration of gravity;

W = superficial velocity of the mixture.

The methodology for calculating the hole.

The purpose of calculating the well is to determine the pressure at the bottom, as well as the main hydraulic variables in the wellbore: the phase velocity, their density, the gas-containing consumables, flow structure a mixture of true gas-containing constituting a full differential pressure. Mathematically, the problem reduces to the integration of equations (7). In the transition phase the only possible method of numerical integration is. Advantages of this method for calculating the wells without the transition phase is the lack of assumptions that are commonly made in an attempt to receive a primitive from the equations (7) in the form of elementary functions.

The algorithm for calculating the motion of gas-liquid mixture in the bottom zone and the wellbore.

The block diagram shows the sequence of the following procedure: In the mouth of the well defined parameters

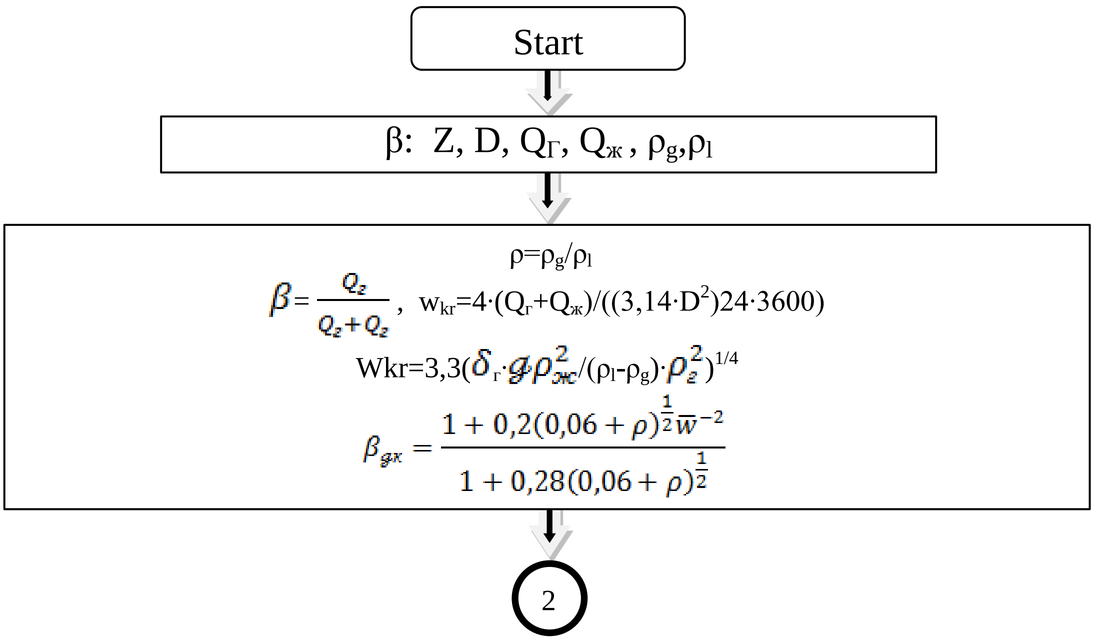
To calculate the hole in the primary section compile calculation algorithm.

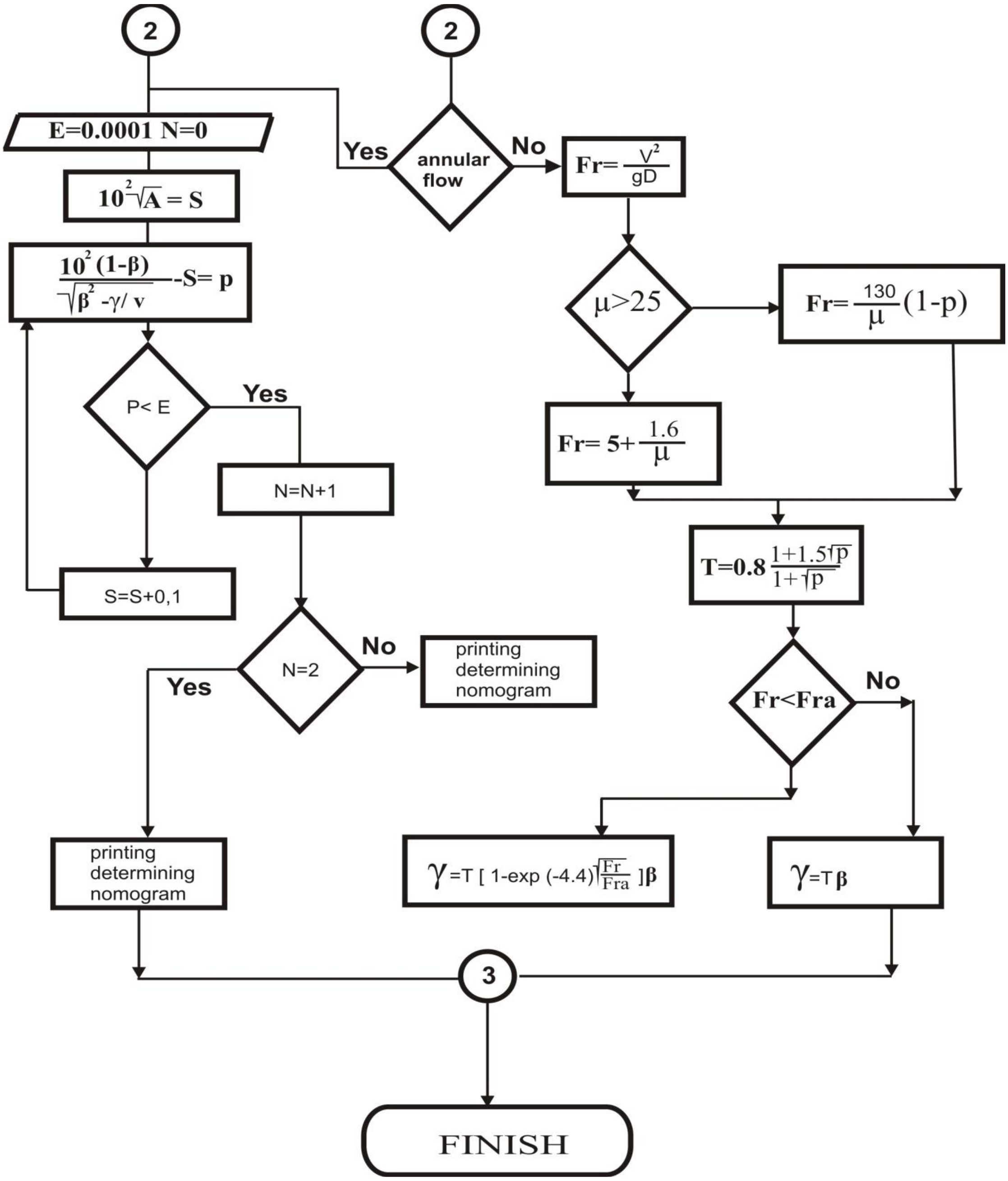
Conclusions. As a result of this work defined the hydrodynamic characteristics of possible flooding bottom zone gas wells.

It was found that the conditions for the proper calculation of the removal of the liquid from the bottom is not enough only to define the total well production as "critical" minimum flow rate required for the complete removal of the liquid from the bottom.

The prerequisite is a linkage between the profile of the inflow of gas to the well of power formation, deep flowing suspension fluid pipe character falls on slaughter. On the basis of the solution gas-liquid mixture in the trunk and in the range of formation developed in the simplest setting method of calculating the movement of gas-liquid mixture in the "reservoir- slaughtering -estuary" well.

As a result, it is possible that the establishment of the necessary technological operation mode.





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