# TRANSPORTATION AND SEDIMENT OF FLUID IN CHANNEL FLOW

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***Abstract:*** *The influence of roughness dimensions on the hydraulic losses in the pumping station machine channels was studied and the hydraulic method for their correct determination based on the results of the flow movement, as well as the hydraulic losses in the machine channels were studied. The method of correct determination, measures to improve the order of these hydraulic losses were developed, and its application to the operation process of the pumping station is the scientific novelty of the dissertation.*

***Keyword****: pasos station, wash canal, operating mode, water intake.*

**Sedimentation of sediments and washing of bed soil.** Sedimentation of fluids is a component of the formation of internal deposits. It mainly occurs in the period of low water, when the speed of the water is small, and the current does not have the opportunity to transport the flowing water. Sedimentation of individual liquids with the correct shape has been well studied theoretically and experimentally [6,12,45]. Since the theoretical expression of water flow through particles with complex and "wrong" shape is more difficult, they are studied only by experimental research. As the particle diameter increases, their deposition increases and is calculated according to the formula derived from the balance forces acting on the particle:

$$W_0 = \sqrt{g d_0 \frac{4}{3C_D} \frac{\rho_T - \rho}{\rho}}, \qquad (1.1)$$

where is the coefficient of hydrodynamic resistance.

to the sedimentation rate shown in the formula $\frac{\rho_T - \rho}{\rho}$ of the difference in The effect of relative densities is the same for particles of different nature and shape, that is, it is one of the main physical factors affecting the settling of liquid particles, and the degree of influence of this factor It is necessary to be examined experimentally. The linear cross-sectional dimension of the particle also affects the settling velocity because $W_0 - d^{1/2}$. It should be pointed out that (1.1) Another physical factor, i.e., the effect of temperature-dependent fluid viscosity, is not included in the connection. So, (1.1) is the effect of viscosity in connection $C_D$ reflected in the coefficient. To the

data of blind experiments [6,12,45] $C_D$ The hydrodynamic coefficient depends on the Reynolds number for almost all particles:

$$\mathrm{Re} = \frac{W_0 d_0}{\nu} . \qquad (1.2)$$

This formula does not have parameters that take into account the shape of the particle in its structural structure, because it was obtained for spherical particles. Therefore, the influence of their shape on the sedimentation rate of particles should be considered experimentally and computationally and analytically. As a result of the analysis of experimental data $C_D$ The following formulas were proposed to determine the hydrodynamic coefficient:

$$C_D = \frac{24}{\mathrm{Re}} + \frac{1}{2} C_{Dc} \left( 1 + \sqrt{1 + \frac{100}{C_{Dc}\,\mathrm{Re}}} \right), \qquad (1.3)$$

Here $C_{Dc}$ - The drag coefficient of a spherical particle at high values of Reynolds number. For spherical particles $C_{Dc} = 0,44$ when (1.3) the formula takes the following form:

$$C_D = \frac{24}{\mathrm{Re}} + 0,22 \left( 1 + \sqrt{1 + \frac{220}{C_{Dc}\,\mathrm{Re}}} \right) \qquad (1.4)$$

in formulas (1.3) and (1.4). $C_D$ the influence of the size of the particle shape $C_{Dc}$ is taken into account by entering the coefficient. The greater the surface area of the particle, the greater the effect of friction on the settling velocity. As a degree of reflection of the particle surface area $f = (d_S / d_0)^2$ Table 1.

**Table 1.**

| | |
|---|---|
| $f \le 1,2$ | Round particles, not pushed out (sand, fireclay, clay, aluminosilicate, lead glitter) |
| $1.2 \prec f \le 1,5$ | Sharp-grained (non-round sand, anthracite artificial graphite) |
| $1,5 \prec f \le 1,8$ | Shaped long-storable particles (coke, slanes, coal powder) |

It should be noted that, comparing the prediction of the possibility of sedimentation of small particles with the hydraulic mass W, which has a vertical oscillating velocity, it is wrong that there is no sedimentation of small particles even at very low velocities of turbulent flow. ri leads to the conclusion. Fine dispersion is the main feature of the particle deposition process, and it is considered that the particle size is less than the thickness of the viscous layer. Therefore, in the final

phase of the sedimentation process, the characteristics of the flow movement at the boundary of the narrow layer play an important role.

The second feature is that the turbulent diffusion does not play the role of maintaining the equilibrium of the liquid concentration and takes the role of transporting the liquid in the vertical depth of the flow to the upper limit of the viscous layer. The third feature is fine settling particles $\delta_{np} = (1-2)\mu$ consists of the release of surface cohesive forces that occur when approaching the subsurface at a distance of less than. Let's look at the scheme of deposition of small particles in the "Otstoynik" regime. In this case, the turbulent rotational velocities are in all flow regions except for the narrow layer ($u'_z >> W$ )ensures the mixing of small particles. In this case, the deposition of small particles with a speed W $\delta_в$ occurs only at the boundary of the viscous layer. At the upper boundary of the viscous layer, under the action of the turbulent exchange mechanism, particles are brought from the main thickness of the flow. At the same time to the surface of the underground unit $cW$ to (s- the concentration of particles at the upper boundary of the viscous layer) equal particles settle. The flow balance in the section can be expressed by the following equation:

$$hdc = -cWdt\,, \qquad (1.5)$$

here $h$ – flow depth.

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