WEB OF SYNERGY:
International Interdisciplinary Research Journal
Volume 2 Issue 4, Year 2023 ISSN: 2835-3013
https://univerpubl.com/index.php/synergy

Regarding the Analysis of the Parameters of Horizontal Gravity Sump

Iminov Ilkhomjon Khalimjon o'g'li
A doctoral student, Andijan Institute of Agriculture and Agrotechnologies

A. M. Arifdjanov
Professor, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, National Research University

Article Information

Received: February 10, 2023
Accepted: March 11, 2023
Published: April 12, 2023

Keywords: *Turbidity particles, water consumption, fraction composition, parameter, length, width, depth, slope, flow kinematics, beds, hydraulic size.*

ABSTRACT

We will be able to determine the parameters of sprinklers used in irrigation systems, which is one of the urgent problems of today, in many countries of the world and in our republic, and consider the analysis of what properties they depend on. In addition, the opinions of scientists about turbidity affecting the operation mode and parameters of clarifiers and the analysis of turbidity using formulas are discussed. Sediments and their effects on water flow are analyzed using various recommended formulas. As a result of these analyses, we will consider the calculation of the optimal values that we can accept the parameters of the silencer.

Enter. One of the urgent problems in the development of agriculture and water management is increasing the efficiency of irrigation systems and reclamation facilities, ensuring their reliable use, reducing their repair and operating costs [1,2].

Currently, while analyzing the problems in irrigation systems, taking into account the level of turbidity in water, the calculation fraction of discharges, of course, the study of flow kinematics in water structures, starting from the water supply channel, up to the clarifier and the vane chamber, and design works are being carried out based on scientific research. In particular, according to the views on discharges, river discharges are divided into suspended and bottom discharges depending on the nature of the river flow. However, it can be considered conditional, because all fluids moving with the current move along the bottom in a suspended state or jumping, depending on the current particles and speed at certain moments of time [3, 201-208 p.], [4, 12 pp.].

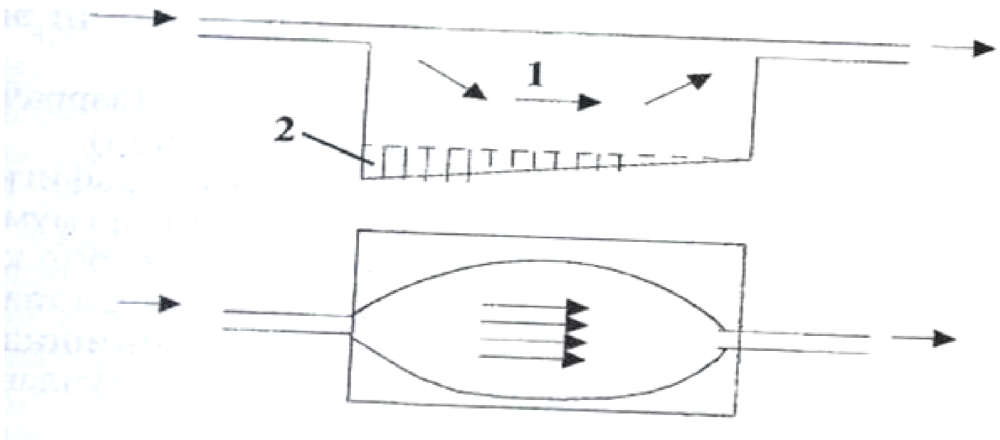
Therefore, some limitations and assumptions are allowed to facilitate the solution of these problems based on the results of the analysis of the scientists' scientific researches on the effect of liquids on the irrigation systems. In practice, in the study of hydraulic and hydrological processes related to flow, research and experiments of a certain scale are carried out, as a result of which, mainly, imperial and semi-imperial formulas are obtained, and they are widely used in calculation and design. In particular, the implementation of the speed of the flow in water intakes using a mathematical method, that is, on the basis of numerical calculations, brings some convenience. We can see that the speed of the flow in the coolers decreases with the change of distance [5, 25-26-b].

In irrigation systems, the goal of measuring the speed of the flow in the clarifiers is considered the main element of the water regime, determining the water consumption and analyzing the settling sludge, choosing the optimal speed, and studying the dynamics of the movement of sludge particles in the water intake facility based on this [6, 78- p. 79].

Based on these considerations, the article states that the parameters of horizontal sprinklers used in irrigation systems are studied and analyzed.

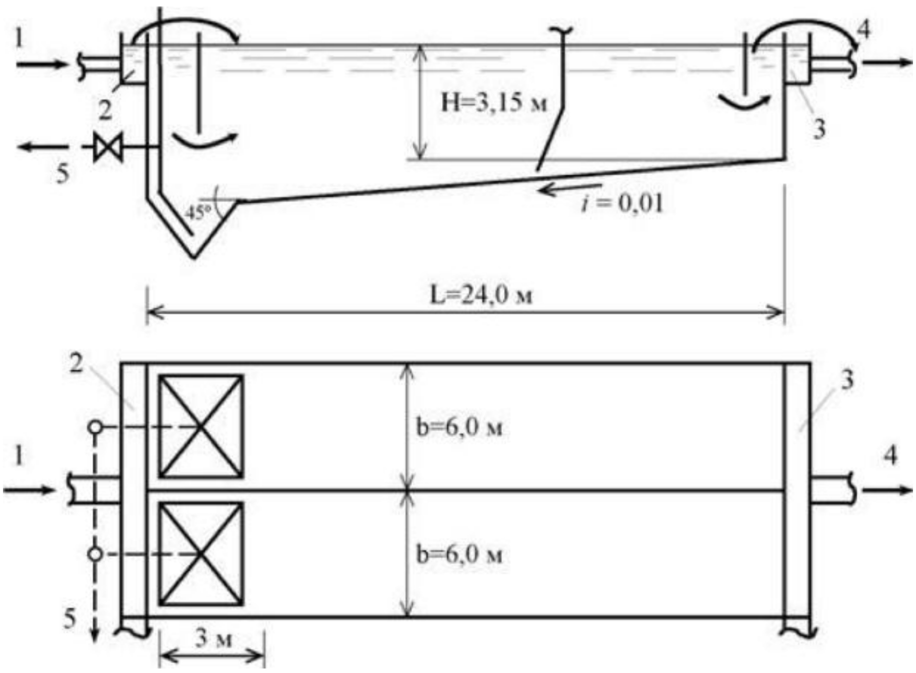
Research method. The horizontal clarifier used in irrigation systems is considered as a pond for clarifier, water enters from one side of the clarifier and moves at a low speed, and as a result, cloudy particles settle, and the settled water exits from the other side of the clarifier. This is how the cooler is designed [9-10].

Pic. 1. Project view of a horizontal sump.



Here, 1s-detection area, 2- is the turbidity collection area.

Pic. 2. Design calculation work of the sumper.



Here, 1- source is water; 2 - distribution channel; 3 - collection channel; 4 - output of purified water; 5 – sediment

Solution method. First of all, let's analyze the following concepts, "Turbidity" refers to the ratio of the total mass of fluid particles to the total volume of the flow (including water and fluid)

$$S=\frac{m_s}{V_0} \quad (1)$$

Here, m_s is the total mass of particles, V_0 is the total volume.

Fluid concentration refers to the ratio of the volume of fluid particles to the total volume of the flow [12, p. 56-61]

$$S=\frac{V_s}{V_0} \quad (2)$$

Here, Vs- total volume of fluid particles.

Several geometrical and hydraulic concepts are included in the calculation work in determining the laws and quantities of fluid movement in the stream. Including average diameter of fluid particles, turbidity, concentration of fluid particles, hydraulic size, etc.

Based on the above ideas and formulas, it is necessary to ensure that the liquid settles in suspension in the sump and remove the gravitational condition. The experimental analysis of the gravitational theory was fully performed by N.A. Mikhaylova, in which the data of this theory differ significantly from the experimental data. [23,111-115-p].

As a solution, according to Gravitational Theory, M.V. Vielikanov offers the following connection for calculating the distribution of the flow according to the flow depth [14,144-145-b]:

$$S(z)=S_0 e^{\left[-\int_{\eta_0}^{\eta}\frac{\alpha*\eta}{(1-\eta)*\ln(1+\frac{\eta}{\xi})}\right]^{\beta}} \quad (3)$$

he length of the strainer is considered an important parameter, and a number of scientists presented the results of their scientific research in order to calculate the optimal solution. In particular, scientists Y.A.Ibad-Zadye and Ch.G.Nuriyev [18] put forward the following view when calculating the Tindirgich length, that is, "the ratio of excess turbidity to the average rate of sedimentation of excess particles in any flow in which smooth movement is observed remains a constant quantity in the stem and is equal to the ratio of the initial saturated turbidity to the average hydraulic size of the particles in the initial state. Based on these views, they recommended the following to determine the length of the probe:

$$L_0=\frac{S_0-S_{ch}}{S_{ch}-S_k}\cdot\frac{\vartheta\cdot H}{W} \quad (4)$$

In addition, the distribution of turbidity along the length of the clarifier is also important, for this the following formula is recommended [16]:

$$S=S_0\left(\frac{w_0}{w}\right)^{2B} * e^{\left(-\frac{D}{Q^2}\int_0^x sin\propto w^2\,dx\right)} \quad (5)$$

Of course, in this case, we take into account the non-uniform movement of the turbid flow and use this differential equation[24]:

$$\frac{dh}{dc} = -i - \frac{\propto * Q^2}{g * w^3} * \left(\frac{dw}{dh} * \frac{\partial h}{\partial l} + \frac{dw}{db} * \frac{\partial b}{\partial l}\right) + \frac{Q^2}{w^2 * l^2 * R} \quad \textbf{(6)}$$

These scientific studies show that it is necessary to study the important parameters of the horizontal gravity clarifiers in irrigation systems and to change them in accordance with the mode of operation.[28]

Summary. The analysis of the parameters of horizontal gravity clarifiers in irrigation systems, L-length, b-width, h-depth, has determined that in the design of clarifiers in irrigation systems, it is necessary to determine the accounting works that exist in the design of clarifiers, such as the amount of discharge, the movement of silt particles, in a scientifically approachable state.

Because the movement of current particles moving in the quenchers affects the amount of current. As part of the study, as a result of the uneven distribution of the speed of the flow, the water level, the amount of turbidity in the water, the size of the fraction, the change in the speed will cause the structure of the flow to be disturbed, as a result of which the clarifier and turbidity will settle, increase the hydraulic resistance in the suction network, water transfer of the pumps It can be observed that it decreases. The above-mentioned analyzes show that we can observe the sedimentation of turbidity in the clarifier depending on the speed distribution of the flow in the clarifier.

№	**List of Literature**
1	Ўзбекистон Республикаси Президенти Ш.М.Мирзиуоевning 2019 yil 18 iyundagi “Qishloq xo‘jaligida yer va suv resurslaridan samarali foydalanish chora-tadbirlari to‘g‘risida”gi PF-5742 sonli Farmoni. – Toshkent, 2019.
2	Li, X., Zhou, S., & Xu, G. (2021, May). Experimental study on flow pattern in forebay pump station and rectification scheme. In IOP Conference Series: Earth and Environmental Science (Vol. 768, No. 1, p. 012014). IOP Publishing.
3	Arifjanov A.M., Fatxullaev A.M., Samiev L.N. O‘zandagi jarayonlar va daryo cho‘kindilari (Monografiya). – Toshkent: "Noshirlik yog‘dusi",2017 –191b.
4	Arifjanov, A., Gapparov, F., Apakxujaeva, T., Xoshimov, S. Determination of reduction of useful volume in water reservoirs due to sedimentation. IOP Conference Series: Earth and Environmental Science, 2020, 614(1), 012079 doi:10.1088/1755-1315/614/1/012079
5	Arifjanov A., Allayorov D. Daryo cho’kindilarining gidromexanik parametrlari. Irrigatsiya va melioratsiya. 2020 y. №1-son. 29-33 b.
6	Arifjanov A.M., Akmalov Sh.B., Samiyev L.N., Alimov N.A. Sug‘orish kanallaridagi irrigatsion tindirgichlar xisobiga doir // Arxitektura, qurilish, dizayn.- T, 2013. №4 – B.58-59.
7	Isakov X., Samiyev L., Babajanov F.. Daryo cho‘kindilarining oqim uzunligi bo‘yicha tawsimotini xisoblash uslublari. Agro Ilm.2019 1-son.
8	A.M Arifjanov, L.N Samiev, A.N Xazratov Ochiq o‘zanlarda loyqali oqimlar harakatini gidravlik modellashtirish masalalari. - Innovatsion texnologiyalar, 2021
9	Arifjanov A.M, Samiyev L.N. “Daryo cho'kindilarining fraksion tarkibining kimyoviy tarkibiga bog'liqligi”// Irrigatsiya va melioratsiya jurnali, 2018y.-2-son.
10	Акмалов Ш., Самиев Л., Абдураимова Д., Описание метода расчета ирригационных отстойников // Агро илм.- Т, 2012.- №4(24).
11	Гиргидов А.Д. Характеристики турбулентного массопереноса в открытых руслах //

	Гидротехническое строительство.– М, 2007-№ 5.
12	Замарин Н.А. Транспортирующая способность и допускаемые скорости течения в каналах. – Гострансиздат.- М.-Л, 1951. –82 С..
13	Карнаухова Г.А. Влияние областей переменного подпора на состав воды водохранилищ // Фундаментальные проблемы изучения и использования воды и водных ресурсов. Иркутск, 2005. -С. 88–89.
14	Латипов К.Ш., Арифжанов А.М. О модели движения взвесенесущего потока в руслах // Проблемы механики.– Т, 1996. - № 6.-С. 51-54.
16	Decree of the President of the Republic of Uzbekistan Sh. Mirziyoyev, No. PF5742, dated Jule 18, 2019, "Qishloq xo'jaligida yer va suv resurslaridan samarali foydalanish chora-tadbirlari to'g'risida" [On measures for the effective use of land and water resources in agriculture]. Tashkent. 2019. (in Uzbek).
17	Li, X., Zhou, S., & Xu, G. (2021, May). Experimental study on flow pattern in forebay pump station and rectification scheme. In IOP Conference Series: Earth and Environmental Science (Vol. 768, No. 1, p. 012014). IOP Publishing.
18	Arifjanov AM, Fatkhullaev AM, Samiev LN, Uzandagi zharayonlar va daryo chukindilari [Uzen processes and river sediments]. Tashkent, 2017: Monograph Publishing House, 191 r. (in Uzbek)
19	Arifjanov, A., Gapparov, F., Apakxujaeva, T., Xoshimov, S. Determination of reduction of useful volume in water reservoirs due to sedimentation. IOP Conference Series: Earth and Environmental Science, 2020,
20	Сагдатуллин А. М Разработка математической модели автоматизированного электромеханического комплекса насосной станции //Математическое моделирование. – 2015. – Т. 27. – №. 4. – С. 3-15.
21	Khodjiev, A., Ikramova, M., Akhmedkhodjaeva, I., Xoshimov, S. Estimation of sediment volume in Tuyamuyun hydro complex dam on the Amudarya River. IOP Conference Series: Materials Science and Engineering, 2020, 883(1), 012048 doi:10.1088/1757-899X/883/1/012048
22	Apakxujayeva T., Alovxonova D. Suv omborlarini loyqa bosishini kamaytirishga doir tadbirlar // Qishloq va suv xo'jaligining zamonaviy muammolari mavzusidagi an'anaviy XV-respublika ilmiy amaliy anjuman. 15-16 aprel, Toshkent, 2016y
23	Gapparov F.A., Narziyev J., Umarov M. Suv omborlari loyqalangan hajmining o'zgarishini baholash // "Suv xo'jaligi va sug'oriladigan yerlarni meliorasiyasini dolzarb muammolari" (Respublika miqyosidagi ilmiy-amaliy anjuman materiallari, 12 dyekabr 2011yil), SANIIRI. -T. 2011.
24	Ibrahim, L.A.; Abu-hashim, M.; Shaghaleh, H.; Elsadek, E.; Hamad, A.A.A.; Alhaj Hamoud, Y. A Comprehensive Review of the Multiple Uses of Water in Aquaculture-Integrated Agriculture Based on International and National Experiences. Water 2023, 15, 367
25	Arifjanov, A., Gapparov, F., Apakxujaeva, T., Xoshimov, S. Determination of reduction of useful volume in water reservoirs due to sedimentation. IOP Conference Series: Earth and Environmental Science, 2020,