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Resource Efficient Irrigation Systems in Agriculture

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Abstract: rational use of irrigation systems in Uzbekistan's agriculture, comprehensive use of foreign methods and technologies in the field, including solutions to existing shortcomings, a number of organizational works to be carried out are expressed in the article. The advantages of using energy-efficient technologies are covered in detail. In the agricultural system, issues of improving irrigation facilities and measures to prevent water wastage are covered in detail.

Keywords: Water supply, water pipelines, energy, irrigation system, energy-saving irrigation system, non-pressurized mode, closed network, main pipeline, distribution pipeline.

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The aim of the study is to study various efficient irrigation systems projects. Determining the shortcomings of pipelines with pressure-free operation, the possibilities of their use in mountain and mountain areas, as well as the development of energy-saving irrigation systems that work with minimal use. Pumping and power equipment and external sources of electricity. The main directions of improvement of irrigation systems with the use of pipes without pressure. Projects of energy-efficient irrigation systems with non-pressurized operation of pipes are offered. During operation, these systems require minimal energy costs by using the potential of foothills and mountainous areas and converting the existing hydropower resources of water flows into mechanical energy of fluid flow.

Necessary work order in the pipeline network.

Providing water to irrigated areas in accordance with the irrigation methods used in irrigation, which allows to minimize inefficient losses in irrigation. Organization of a self-flow system. At the current stage, the conditions of agricultural production predetermine the creation of efficient resource-saving and environmentally friendly irrigation systems of the new generation, which should ensure the minimization of energy, labor and irrigation means, as well as all unproductive water costs.

Irrigation water losses during filling and unloading

In addition, the constant increase in the prices of energy carriers and basic consumables required a revision of a number of fundamental rules and approaches. Assessment of the economic and energy efficiency of irrigation and the use of low-pressure and non-pressure irrigation takes place. Systems should develop measures aimed at eliminating emergency, ineffective and technological losses and discharges, as well as saving electricity. Using the energy of water flow, there are now significant reserves of undeveloped land suitable for irrigation in mountainous and sub-mountainous areas. To irrigate them, energy-saving systems with gravity or self-pressurized water supply using water energy flow, thereby reducing the energy intensity of irrigation systems.

Non-pressurized irrigation network. At the beginning of the pipeline, a water intake or outlet from the main circulation channel, regulation basin, etc. is built. Pipes to irrigation canals located on both sides of it, piped water outlets. A drainage hydrant is installed at the end of the distribution pipe, and emergency spillways are installed at the ends of the irrigation canals to a drainage channel along the forest belt surrounding the cropping area. The main and distribution pipelines can be located both along and across horizontal lines, as well as at some angle to them. placed at an angle. With a large irrigated area, there may be first and second order distributors as well as third and fourth order distributors for small farms and irrigation systems.

In some cases, there are only main pipelines and first-level distributors. In these systems, water is supplied from the distributor to a temporary watering device, irrigation pipe or flexible hose, from which furrow, line or sprinkler irrigation is carried out using sprinklers or other irrigation devices that have their own pump and power unit. can be done.

In the non-pressurized version of the network, in contrast to the pressure, it is inevitable that a certain waste stream will appear at the end of the distribution pipes, which reduces the efficiency of the system, but reduces the construction cost of non-pressurized devices. The cost of building a non-pressurized network is much lower than that of a pressurized network. Therefore, in the development of energy efficiency (working with minimal energy consumption), it is necessary to consider and eliminate new generation irrigation systems with a closed non-pressurized irrigation network.

Disadvantages of previously used projects of irrigation systems the potential of foothills and mountainous regions. For this purpose, we offer: ring schemes, zonal location of main or inter-farm pipelines, phasing distribution pipes with the installation of control ponds that can also be used for fisheries and waterfowl breeding needs, using a pump to create a waste water collection basin in the lower zone and a plot compatible with a stationary irrigation system required pressure, drip irrigation system with water extraction from the waste water of the upper zone

According to the above, there were the main areas of improvement projects of energy-saving irrigation systems without pressure The procedure of operation of the pipelines presented in Figures 1-6.

Figure 1 shows a diagram of an energy-saving pressureless irrigation system.

A system of ring regulation of the network of distribution pipes using the flow of waste to irrigate the lower areas and fill the reservoirs.

This scheme provides a reliable and continuous water supply by redistributing the flow in the network, as well as by collecting the waste flow in communal reservoirs or a management pond for other purposes.

for further consumption of water collected for irrigation at a distance plots. The irrigation system consists of an irrigation source (it can be mountain river, stream channel), a water intake facility with or without a filter (with a filter - for taking water from a mountain river, without a filter - for receiving water from the separation channel), distribution ring pipes and irrigation channels (temporary sprinklers) for receiving water with sprinklers. Irrigation channels (temporary sprinklers) have emergency discharges, through which water enters the discharge channel or pipeline. At the end of the distribution pipes, there is a discharge hydrant that leads the water into a reservoir or control basin.

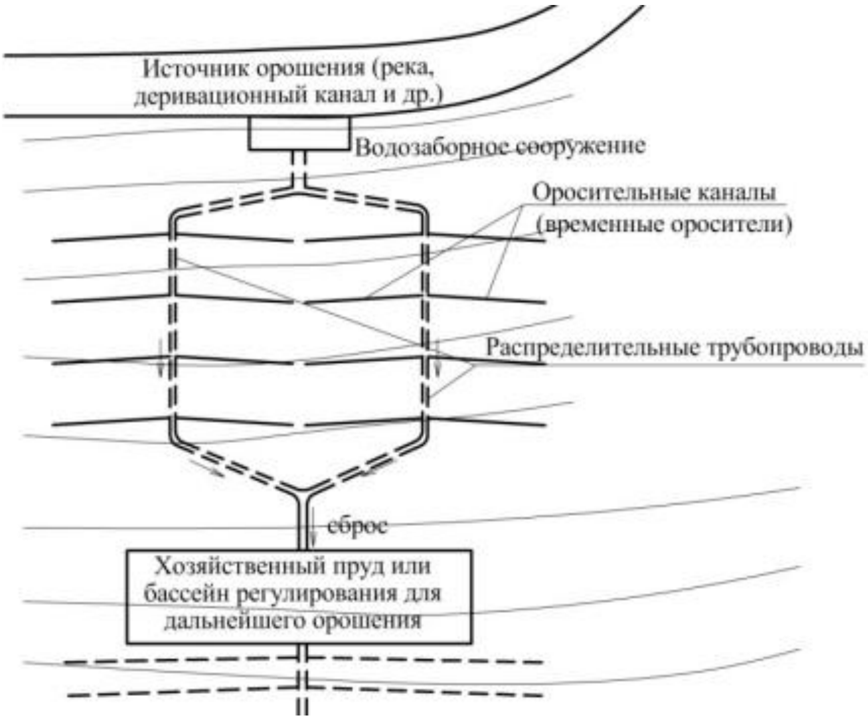

Figure 1 - Energy-saving pressureless design of irrigation system distribution pipes with ring network device

Figure 2 shows a diagram of an energy-saving pressureless irrigation system.

zonal regulation systems of trunk or inter-farm pipelines for use as wastewater receivers from upper areas.

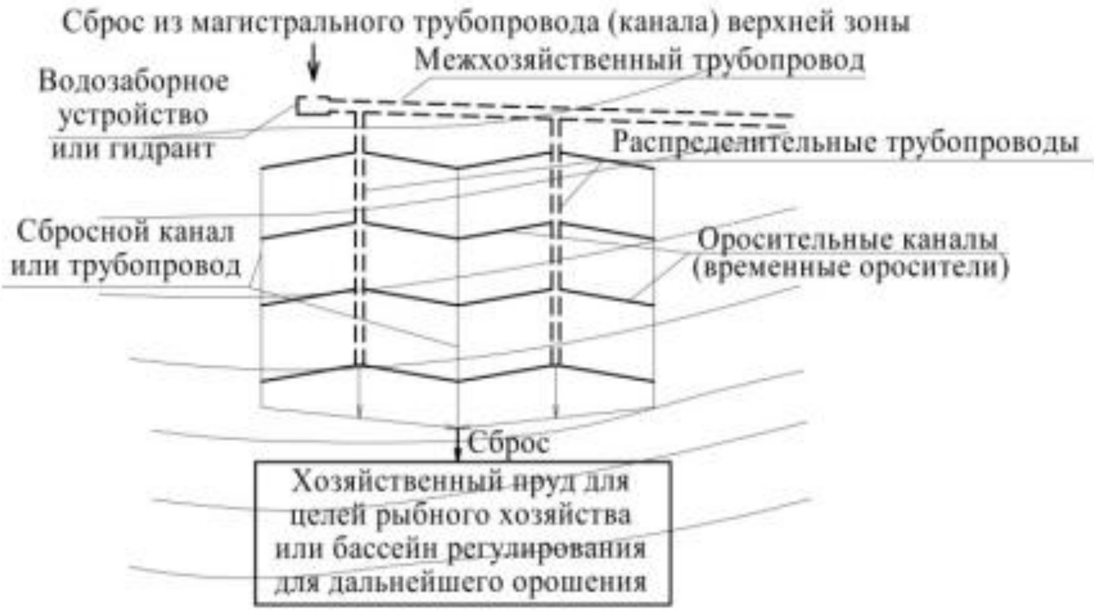

Figure 2 - Irrigation system with energy-saving non-pressurized design zoned mains or inter-farm pipelines

The irrigation system consists of a water intake device (when it is taken from a canal) or a hydrant (when it is taken from a water pipeline), an inter-farm pipeline, from which distribution pipes go in the direction of horizontals. Irrigation channels or temporary sprinklers leave the distribution pipes through hydrants - outlets. Irrigation channels (temporary sprinklers) have emergency discharges through which water enters a discharge channel or pipeline, through which water is discharged to a control basin. Distributor - Main pipes are equipped with hydrants, through which water enters the communal pool or control basin. Scheme of an energy-saving non-pressure irrigation system with the gradual placement of distribution pipes and the construction of day or day ponds. Seasonal regulation in the irrigation system (with relief options). For other purposes as well (for example, for fisheries and waterfowl breeding) is shown in Figure 3. The irrigation system consists of the following.

from the water intake facility, the main pipe from which the distribution pipes come out I. Hydrants- through the distribution pipes

Pipes come out of irrigation canals or temporary sprinklers. Irrigation is carried out by irrigation machines with water intake from open sprinklers.

Figure 3 - Energy-saving non-pressurized design step irrigation system distribution pipes

Irrigation channels (temporary sprinklers) have emergency discharges, through which enters the discharge channel or pipeline through which the water is discharged to the control basin. The distribution pipes are equipped with discharge hydrants I, through which water enters the control basin. From the control basin of the first level, water enters the II distribution pipelines through the water intake. Irrigation channels or temporary sprinklers extend from distribution pipes for irrigation or surface irrigation. Also, from the distribution pipes, it is possible to leave flexible irrigation pipes for surface or drip irrigation.

Irrigation channels (temporary sprinklers) contain emergency discharges, through which water enters a discharge channel or pipeline, through which water is discharged to a control basin. Distribution pipelines II are also equipped with discharge hydrants that enter the water control basin, which can be used for fishing purposes.

Scheme of an energy-saving non-pressure irrigation system with a device

The collection basin for the waste water of the lower zone used in the stationary spray system when the necessary pressure is created by the pumping station is shown in Fig. 4. The irrigation system consists of a main pipe that receives waste water from the upper zone and is distributed from it.

Pipes. Irrigation channels or temporary sprinklers leave the distribution pipes through hydrants - outlets. Irrigation is carried out by irrigation machines with water intake from open sprinklers. Irrigation canals (temporary sprinklers) emergency disposal, distribution pipes are available equipped with hydrants where water enters the waste a pipe or pipeline through which water is discharged into a waste collection basin Water from the collection basin is supplied to the stationary spray system when the required pressure is created using a pumping station.

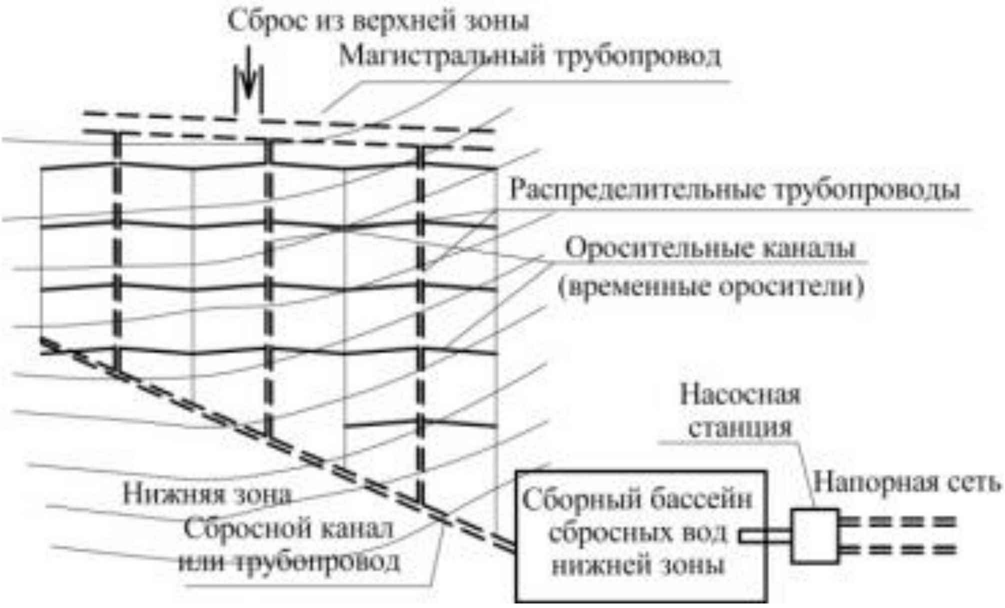

Figure 4 - Pressureless irrigation system with an energy-saving design device at the lowest part of the pressure network for spraying

Schemes of energy-saving non-pressure irrigation system using additional flow for drip irrigation of lower areas are shown in Figures 5, 6.

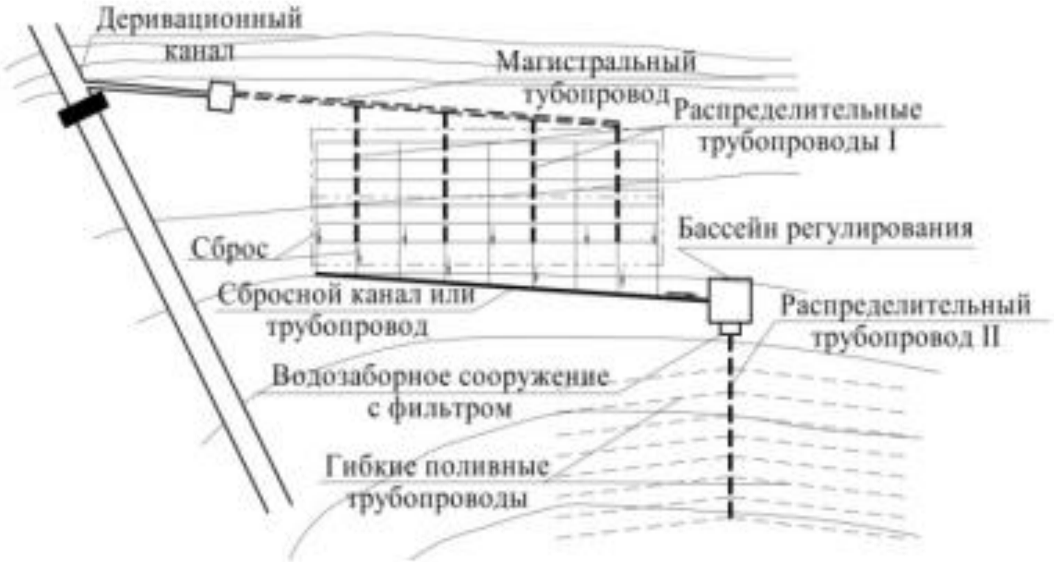

Figure 5 - Design of an energy-efficient derivative of a non-pressure irrigation system with a system device drip irrigation with waste water from the upper zone

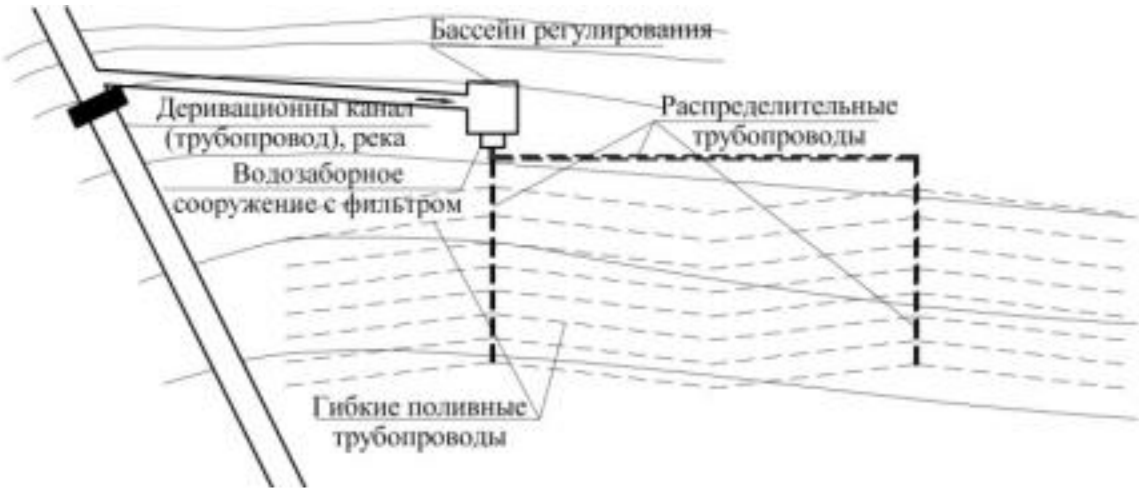

Figure 6 - Design of an energy-efficient derivative of a non-pressure irrigation system with a device

Drip irrigation systems

The irrigation system consists of a circular channel, from which water enters the distribution pipes I.

Irrigation channels or temporary sprinklers run out of cast pipes. Irrigation channels (temporary sprinklers) have emergency discharges, and distribution pipes have discharge hydrants through which water enters a discharge channel or pipeline, through which water is discharged to a control basin.

Water is supplied by taking filtered water from the control basin.

This scheme can also be used when water is taken directly from the irrigation source.

The proposed projects of free-flow piped energy-efficient irrigation systems utilize the potential of foothills and mountainous areas, and operate with minimal energy consumption by converting the available hydropower resources of artificial or natural water flows into the mechanical energy of liquid flow. . This creates the necessary operating mode in pipeline networks, minimizing the use of pumping-power equipment and external sources of electricity to supply irrigated areas with irrigation water according to irrigated irrigation methods. This minimizes the wastage of irrigation water and thus increases the efficiency of the system.

Implementation of the proposed irrigation systems projects can have a positive impact not only on many aspects of irrigated agriculture but also on fisheries.

CHARACTERISTICS OF DEVELOPMENT OF INTEGRAL MECHANISM

REPAIR AND REPAIR WORKS

The formation of machine technologies and machine systems is the basis for the development of a strategy for the development of complex mechanization of repair and restoration. In recent years, the issue of the need to develop a perspective strategy for the development of complex mechanization of repair and restoration works has become acute. The agricultural production of the Republic of Uzbekistan is based on modern technologies and technical means. One of the main steps in solving this problem is the creation and introduction of machine technologies and systems of machines for the complex mechanization of agriculture. Development of machine technologies and machine systems, scientific institutes and design organizations should use progressive methods.

The development of technical tools based on block-modular construction is not only individual machines, but also their systems and standard dimensions [1]. This reduces the time for the production of single technical means and generally creates conditions for the organization and enterprises to equip the water industry with all the necessary equipment in the conditions of multiformity of machine technologies and technical means of agricultural production.

Recommendations on the purchase of the necessary mechanization tools from Uzbekistan or abroad with high technical, economic and technological indicators. Machine technologies and machine systems should include clear scientifically based recommendations, in particular: what machine technologies, technical means. What technical and operational parameters should they have in order to ensure complex mechanization of water management work with minimum costs in the future.

Critical analysis is needed to solve the problem:

- relevance and requirements of regulatory and technical literature effectiveness of current norms and recommendations;
- scientific and technical achievements in the field of mechanization of water management and reclamation works;
- works devoted to reconstruction, repair and theoretical research restoration of parameters of use of irrigation and collector-drainage channels and their structures in the conditions of Uzbekistan;
- regulatory documents for cleaning, repair, reconstruction and production restoration of irrigation and collector-drainage channels and their structures;
- technological schemes for the production of works in the cleaning, repair, reconstruction and restoration of irrigation and collector-drainage channels and structures;

on them;

- methods and schemes of organizing the work of excavators on surfaces of various purposes;
- technological parameters of construction and reclamation machines used in cleaning, reconstruction, foreign production equipment;

Repair, repair and restoration of operational indicators of irrigation and collector-drainage channels and their structures;

- sample technological maps for cleaning, repairing, reconstructing and restoring the indicators of use of irrigation and collector-drainage channels and their structures.

Advanced machine technologies for cleaning and repair of irrigation and collector-drainage channels, production of cultural and technical works on construction and improvement of land reclamation, and production of irrigation and irrigation maintenance works and special features of the developed system of machines.

collector-drainage systems:

- to ensure sufficient adaptation of mechanization to technologies

carrying out repair and construction works in the regions, regions, mountain, plain and semi-desert zones, taking into account the geographical landscapes of the Republic of Uzbekistan, taking into account the specified resource and environmental restrictions;

- the scientific validity of the regulation of technological requirements for equipment;

multipurpose and multifunctional economic, operational indicators

technical means of mechanization of reclamation work for purchase abroad;

- Provision of conditions for the creation of assembled mobile devices in Uzbekistan

(block-module) technical means, universal according to the method of power supply;

- providing conditions for improving the design of working bodies adapted to different soil conditions;
- development of integrated high-performance auxiliary equipment;
- to expand the scope of mechanization of reclamation works and reduce their seasonality.

Advanced machine technology system and cleaning, repair and machines construction of irrigation, collector and drainage facilities (including separately located ones) and implementation of cultural and technical works on land reclamation;

should include the basic techniques specific to the main economic regions implementation of reclamation works and technologies adapted to the conditions of natural and agricultural zones (types) and priority types of agricultural production.

Suggestions:

should be evaluated from the point of view of maintaining ecological and reclamation stability in irrigated lands

stability of the zone and adjacent areas, genetic and hereditary characteristics

signs of major crop rotation in the short and long term.

Planning strategy for the use of mineralized waters as secondary water

resources related to water scarcity must have an adequate organizational framework

excluding technical and technological production cycles

principles of "reorientation" of their consumption, taking into account the possible negative consequences in the "society - production - environment" system. This

the basic requirement of modernity to manage the environment.

Summary.

In other words, I hope that this article has embodied such urgent topics as the introduction of energy-saving technologies to the industry and the further radical reform of irrigation systems. The demand for clean water sources is increasing year by year, therefore, it is our time to use water efficiently and implement new projects in this field.

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