PROTECTION OF TRANSPORT STRUCTURES IN SANDY DESERTS FROM MOVING SANDS

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ABSTRACT

In this article analyzes the results of research and practical experience of foreign and domestic scientists in the field of protecting transport facilities from moving sands; research methods and techniques are being studied; the relevance of the problem and the planned research are discussed.

АННОТАЦИЯ

В статье проанализированы результаты исследований и практический опыт зарубежных и отечественных ученых в области защиты объектов транспорта от подвижных песков; изучаются методы и способы исследования, актуальность проблемы и отзывы о будущих исследованиях.

Keywords: sandy deserts, mobile sands, protection devices, deflation, sand mitigation measures (SMM).

Ключевые слова: песчаные пустыни, подвижные пески, защитные устройства, дефляция, пескозакрепительные мероприятия (SMM).

Over the past years, a number of projects aimed at improving road and transport infrastructure in accordance with international standards, designing, building modern roads, increasing traffic convenience and safety have been funded by World Bank, European Bank for Reconstruction and Development, Asian Development Bank, Islamic Development Bank, Saudi Fund for Development and Kuwait Fund for Arab Economic Development and other international financial institutions [1].

Given the geographical location of the country, the growth of the modern road network is one of the priority tasks in the competitiveness of the economy, the development of transport capacity and the expansion of export opportunities [2].

At present, the total length of the country's road network is 209.5 thousand km, and they are operated in different climatic and topographic conditions (Figure 1.).

In these areas, sand deflation (Latin “deflatio” - flight), i.e., the process of sand movement, occurs on a regular basis. Sand particles displaced by wind and sand accumulate in some places and have a negative impact on the technical condition of transport infrastructure facilities (roads, railways, artificial structures), the safe movement of all types of vehicles [4,5,6] (Figure 2).
From the day the road network was built in the sandy deserts to the present day, the protection of transport infrastructure facilities from moving sands has always been one of the most pressing issues, according to several generations of researchers.


In particular, Professor L.Bruno of the Polytechnic University of Turin (Italy) said in his study that the lack of a classification of measures to reduce the negative impact of sand on the main infrastructure elements of the railways is a sign of the lack of structural elements. proposed [7]. Academician of the Academy of Sciences of Turkmenistan Babaev A.G. developed recommendations for the selection of types, methods and means of protection for mobile sands based on climatic conditions [8,9].

Professor Zokirov R.S. created a scientific school on methods and techniques to protect railways passing through sandy areas from sand landslides. The scientist classified the means of protection of structures from sand into 4 types depending on the occurrence rate [10].

Professor Fozilov T.I. and improved its work, taking into account other indicators [11].

In addition, professors Fozilov T.I, Mirakhmedov M., Adilkhodjaev A.I, associate professor Muzaffarova M.K. described the results of practical experiments in their scientific work on the protection of transport facilities from sand migration using chemicals [12,13,14,15]. The theoretical basis for defining the boundaries of the protection of high-speed railways passing through sandy areas was developed by Professor S.T. Djabbarov [16, 17, 18].

The research suggests the following basic methods of protecting transport facilities from sand drifts in sandy deserts:

1) mechanical protection method (reinforced concrete or metal barriers, walls, hills, geotextiles, etc.);
2) chemical protection method (bitumen, emulsion, polymeric materials, etc.);
3) biological protection method (planting of plants adapted to the desert area).

Today, despite the fact that these methods are sufficiently studied, the results are widely used in practice, no effective method has been developed to protect buildings in sandy deserts, including transport infrastructure facilities from landslide sands.

The growth of desert areas in the last half century shows that one of the most pressing issues today is to further improve the above-mentioned methods of protection against landslides on the basis of information technology, new composite materials, modern computational methods.

References:
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