Chapter 5
Modeling of Subsurface Runoff and Surface Runoff During Storm Precipitation in Low-Slope Undeformed and Surface-Deformed Soils on Agricultural Lands

Vadym Poliakov
https://orcid.org/0000-0003-1724-9454
Institute of Water Problems and Land Reclamation of the National Academy of Agrarian Sciences, Ukraine

Halyna Voropai
https://orcid.org/0000-0002-5004-0727
Institute of Water Problems and Land Reclamation of the National Academy of Agrarian Sciences, Ukraine

ABSTRACT

The mathematical problem addressed in this study concerns the formation of subsurface and surface runoff during storm precipitation in a low-slope area featuring both undeformed and surface-deformed soils. Approximate relationships governing the water accumulation on the surface of these soils and the movement of the satura-

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tion front were derived. Additionally, the timeframe for infiltration and groundwater closure, as well as the dissipation of the surface layer following the cessation of precipitation, was determined. Utilizing generalized initial data for fine soils along with a two-layer soil configuration at the experimental site, the accuracy of the derived relationships was evaluated. This study delves into the process of soil wetting during the formation of a low-permeability interlayer on the surface, resulting from compaction and swelling. A detailed analysis was provided for the comparison of subsurface runoff under conditions of varying degrees of deformation, both with and without surface deformation.

BACKGROUND

Modern climate change has had a significant impact on agricultural production. This leads to a deficit in water supply, which is the main limiting factor for the sustainable functioning of agriculture. New conditions for growing crops are being formed, which manifest as an increase in soil moisture deficit and a decrease in groundwater reserves. Changes in the technological maps of crop cultivation by modern agricultural enterprises are occurring, and the fraction of hydrophilic crops in the structure of crop rotations is significantly increasing (Parry M.L. et al, 1990; Romashchenko M.I. et al, 2020).

Precipitation is the main source of natural water in agricultural lands in the humid zone of Ukraine. Modern fluctuations in annual precipitation occur, on average, almost within the climatic norm, but the general trend is a significant redistribution of seasonal and monthly precipitation (Kyrychenko O. S., 2020; Buksha V. F., 2009; Kuzmych L. et al, 2023). Simultaneously, with an insignificant change in the amount of precipitation in general, the character and intensity of precipitation in Ukraine changed significantly. The number of cases in which half or the entire monthly norm of precipitation falls with a few hours has increased (Kyrychenko O. S., 2020; Buksha V. F., 2009).

An increase in the likelihood of excessive precipitation is noted in the reports of the Intergovernmental Panel on Climate Change (IPCC) and a special report on adaptation to natural hazards, including excessive precipitation (Field C. B., 2012).

Despite a wide range of possible future changes in average precipitation, it is predicted that extreme precipitation events in all seasons may become more intense, leading to a 10-25% increase in the number of wettest days of the year, surface runoff, and rain floods by the end of the century (Wilson L. et al, 2021; Coppola E. et al, 2021; Gutiérrez J. M. et al, 2021).

Assessment of Customer Satisfaction in Online Food Delivery Within Klang Valley

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Technological Innovations in the Food Service Industry (pp. 389-414).
www.irma-international.org/chapter/assessment-of-customer-satisfaction-in-online-food-delivery-within-klang-valley/363562