MODELING OF HYDROPHYSICAL PROPERTIES OF SOIL AS A CAPILLARY-POROUS MEDIUM AND MODIFICATION OF THE MUALEM-VAN GENUCHTEN APPROACH: THEORY

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Based on the concepts of capillarity and the long-normal distribution of soil pores' effective radii a theoretical substantiation for the function of soil differential moisture capacity (a relationship between reduced volumetric soil moisture content and capillary water potential) and its primitive function as a characteristic of soil water retention capacity is presentedRelative hydraulic conductivity of soil is calculated with usage of these functions and Mualem's approach. Hydrophysical parameters are interpreted and evaluated from some physical and statistical soil characteristics. The physically-based approximations for water-retention capacity and relative hydraulic conductivity is also proposed.

Key words: differential soil water capacity, soil water retention curve, hydraulic conductivity of soil, capillarity, lognormal distribution of effective pore radii.