CONTRIBUTIONS TO THE HYDRAULIC DETERMINATION OF DRAINAGE SYSTEMS WITH JUNCTION CHAMBERS

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Abstract

Drains and collectors have the role of collecting the water from an aquifer as well as transporting it to the collecting chamber. In transit, the drains are equipped with inspection chambers at no more than 400 m from each other that serve not only for the maintenance but also as hydraulic junctions for successive sections when there are changes of slope, direction or size, in which case the location distance may be much smaller (Arsenie M., 1982). For the drainage systems (Bârsan E., 2001,), from the hydraulic point of view, the following conceptual models are considered: 1° closed drain with cylindrical/prismatic bed, unconfined, in which there is gradually changing motion and the flow rate varies - on the sections between two successive chambers; 2° singularity with sudden change of section, with rapidly varied movement regime - on crossing a junction chamber. While for the first conceptual model there are already established, real life tested mathematical models, for the second one there are no satisfactory theoretical approaches. Starting from the general equations of hydrodynamics, like the continuity equation, we designed in this paper a mathematical model to determine the functional relation between water levels from the two ends of the two sections of the drain connected by a chamber. This model was implemented in a complex computer program of flow simulation for the entire length of the drainage system, and used to solve a representative study case.

Key words: drainage system, junction chamber, rapidly varied motion, mathematical modeling, numerical simulation