Influence of the Roughness and Shape of the Canal of Trapezoidal Canals on the Pressure Loss of Hydropower Structures

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Abstract

It is known that the problem of determining the hydraulic resistance in free-flow channels (including machine and derivation channels) until recently was solved by using the concept of “maximum permissible speed” V_{max}, (referring to the uniform movement of water). The value of this speed was assigned (and is currently assigned) based on reference data from the type of soil (and in some cases, depending on the depth of water in the canal). Knowing V_{max} and the flow rate, it is easy to find the cross-sectional area, as well as the slope of the channel (using formulas to determine the Shezy coefficient “*C*” or the coefficient of hydraulic friction λ and in accordance with the accepted value of the roughness coefficient). In engineering practice, in hydraulic calculations of the channels we are considering, the Shezy coefficient “*C*” is usually used. Meanwhile, there is an opinion shared by us that when performing the above calculations it is more expedient to use the coefficient of hydraulic friction λ. As you know, the value of “*C*” depends mainly on the coefficient of roughness “n”, the average value of which is the so-called “group roughness”, which gives only a descriptive characteristic of the state of the wetted surface. The absolute roughness, expressed by the value of Δ, is a much more sensitive (in comparison with “n”) estimate of the roughness of the wetted channel surfaces, and therefore its introduction into the practice of hydraulic calculations increases their accuracy. In connection with this formulation of the question, in this work, research was

carried out on escaping; the influence of the shape of the open section of the channel on the amount of pressure loss, in the case of a “smooth” wetted surface and in the case of a channel with a rough wetted surface, as well as the influence of the “degree of roughness” of the wetted surface on the amount of pressure loss. It is this kind of research that makes it possible to put into the hands of the designer, as it seems to us, a complete method for solving one of the most important and urgent problems of the practice of hydraulic engineering.

Keywords

Trapezoidal canal Hydropower Hydraulic engineering Hydrodynamic

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