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WATER WARMING IN HYDROPOWER HEADRACE TUNNELS

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Abstract

The research refers to finding a way to quantify water heating when going through underground adductions. At first sight, in winter, the cold water from the rivers passing through an underground gallery should warm up. There are no approaches to the problem in the technical literature.
All theoretical approaches to natural phenomena are approximate. The number of unknowns is always higher than the number of equations we can write. In order to quantify the phenomenon, we make simplifications. We used an existing calculation model of the heat transfer between the rock massif and the water that transits it. The results obtained by calculation were confirmed by measurements at operating hydropower plants.
The contribution of this research is the identification and validation of the calculation model of the heat transfer between the rock massif and the water from the adductions.

Keywords: hydropower, headrace tunnel, heat transfer, ice jam melting

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