

THERMAL SIMULATION OF CONCRETE DAMS DURING CONSTRUCTION: EFFECT OF THE HEAT EXCHANGE MECHANISMS

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Abstract. *Rolled compacted concrete (RCC) dams are singular hydraulics structures whose safety assessment starts during the construction phase. The hydration of concrete is a chemical reaction that releases heat. Thus, numerical simulations of the thermal evolution of RCC dams are a fundamental tool for the correct design of these projects, preventing excessive temperature rises which may lead to cracking and losses of functionality. Furthermore, the ambient temperature rise due to climate change may also play an important role on the construction schedule, slowing down the construction rates.*

The dam exchanges heat through its surfaces with the surrounding environment due to four mechanisms: convection, long wave radiation, solar radiation, and evaporation of water. Moreover, the heat generation rate depends on the concrete temperature itself. Here, we study the effect of the four mechanisms of heat exchange on the thermal evolution of a concrete dam during its construction through numerical models. We elucidate the importance of every mechanism, and the consequence of disregard some of them.

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