



## **Impact of a grout curtain on groundwater regime in karst: the example of the Đale reservoir (Croatia)**

Ognjen Bonacci (1) and Tanja Roje-Bonacci (2)

(1) Faculty of Civil Engineering and Architecture, Department of Hydrology, Split, Croatia (obonacci@gradst.hr, 385 21 465117), (2) Faculty of Civil Engineering and Architecture, Department of Hydrology, Split, Croatia (bonacci@gradst.hr, 385 21 465117)

Construction of grout curtains in karst terrains is primarily connected with dams and reservoirs. Their role is to increase watertightness and prevent progressive erosion. In this presentation hourly continuous measurement of groundwater level in two deep piezometers near the Đale reservoir is analysed. The Đale reservoir in the Cetina River began operation in 1989. The total length of the grout curtain is 3.9 km. It spreads 120 m below the Đale dam. First analysed piezometer A is drilled in the interior part of the system, between the reservoir and the grout curtain, while the second one B is located in its external part. Distance between them is 200 m. In natural conditions, prior the grout curtain construction, groundwater level fluctuation in both of them was similar (practically the same). Construction of the grout curtain extremely changed groundwater behaviour in each of them. During the six month of continuous monitoring, differences between groundwater levels in them range between +19.86 m (groundwater in B is lower than in A) and -12.77 m (groundwater in A is lower than in B). During the 77% of analysed period the groundwater level in interior piezometer A is higher than the groundwater level in external piezometer B. In other 23% of analysed period the groundwater level in outside piezometer B is higher than in inside A. The construction of the grout curtain caused unnaturally high hydrostatic gradients, which can accelerate the dissolutional expansion of karst fractures. As a result, unbearable leakage of the reservoir Đale can occur over its lifetime. Careful analyses of groundwater level behaviour discover some other very important characteristics of karst underground morphology.