

A practical approach to evaluating water inflow for underground water-sealed storage cavern

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A practical approach that has been successfully applied to evaluate the water inflow for the project of underground water-sealed storage cavern in fractured granite in China are introduced. This approach consists of two steps: investigation of the distribution of groundwater flow path and modeling to evaluate the water inflow in the cavern. Firstly, field investigation methods such as geological survey and mapping, engineering drilling, borehole imaging and engineering geophysical prospecting are used to investigate the distribution of fracture zones and faults. Subsequently, the piecewise water pressure test is performed in the existing boreholes to search the seepage passage which is dictated by the section with large permeability coefficient. Based on this, models such as Hirishi Oshima empirical equation, Misaki Sato Kuniki empirical equation and the empirical analytical equation are utilized to evaluate the water inflow in the traffic tunnel, main cavern and shaft during the construction stage. Results indicate that the seepage passage determined by the piecewise water pressure test corresponds well to the location of fracture zones revealed by field investigation. The evaluation results are confirmed by the surrounding rock quality and water inflow location uncovered by the excavation afterward, which demonstrate the validity of this comprehensive approach.

Keywords: field study, underground water-sealed storage cavern, fractured granite, water inflow, borehole imaging, piecewise water pressure test