A Case Study on the Long-Term Stability Monitoring of Underground Powerhouse Complex Using Geotechnical Instrumentation

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Abstract : Large cavern in Bhutan Himalayas is being monitored since the construction period. The behavior of the cavern is being monitored for last 16 years. Instrumentation includes measurement of convergence of high walls by geodetic monitoring, load on the support systems with load cells and instrumented bolts. Analysis of the results of instrumentation showed that during the construction period of the cavern, the convergence of the cavern varied from 181 - 233 mm in the unit bay area with maximum convergence rate of 2.80mm/day. Whereas during the operational period the total convergence observed was in the range of 21 to 45 mm during a period of 11.30 years with convergence rate of 0.005 to 0.011 mm/day. During the last five years, there were no instances of high tensile stress recorded by the instrumented bolts. Load on the rock bolts have shown stabilization trend at most of the locations. This paper discusses in detail the results of long-term monitoring using the geotechnical instruments and how the data is being used in 3D numerical model to confirm the stability of the cavern.

Keywords : convergence, displacements, geodetic monitoring, long-term stability
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