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Microseismic Analysis Using Event Count and Potency Displacement for Stability Evaluation of an Underground Cavern

Vikalp Kumar[1], Balasubramaniam V R[1], Divyalakshmi K S[1]

[1]National Institute of Rock Mechanics, Bengaluru, Karnataka, India

Abstract

The long-term stability of an underground hydroelectric powerhouse cavern, which depends on the rock-mass deformation rate, is paramount for tunnel engineers. The underground powerhouse cavern of the Tala Hydroelectric Project (THP), Bhutan had faced several strata instabilities issues during its construction and even post-construction. So, a Micro-Seismic Monitoring System, which is continuous real time monitoring, was installed at this underground powerhouse cavern to assess the rock-mass strata status. Seismic source parameters event count and potency displacement revealed the zone of maximum inelastic damage zone in both the major tunnels, namely ma-chine hall and transformer hall, while Gutenberg-Richter relationship forecasted the maximum magnitude in and around the powerhouse cavern. This helped to augment timely support measures to enhance the life of this underground structure.

Keywords: Micro seismic monitoring, Underground cavern, Hydropower, THP and seismic potency