

Background

The use of unlined high pressure tunnels in a hydropower project is mainly based on the in situ stress condition among the others parameters. The state-of-the-art principle in an unlined pressure tunnel is that the minor principal stress in the rock mass should be greater than the water pressure inside the tunnel due to hydrostatic head between the tunnel location and head water level (HWL). The principle has been widely used in the Norwegian rock mass condition. The PhD research is focused on applicability of this principle in the Himalayan rock mass condition. The in-situ stress condition in the Himalaya is supposed to be different from the area of existing unlined pressure tunnels. Hence, it is necessary to analyze the stress state

intensively at the location of unlined tunnels of hydropower projects in the Himalaya considering all possible factors affecting the stress.

Objectives

- Review of existing principles for unlined tunnels
- Numerical modeling of stress state and hydraulic jacking in the unlined tunnels of Norwegian as well as Himalayan hydropower projects.
- Assess the applicability of unlined / shotcrete lined tunnels in the Himalaya
- Publish the research results in journals and conferences, summarize in a PhD thesis

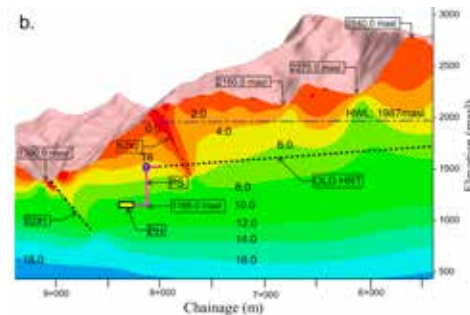
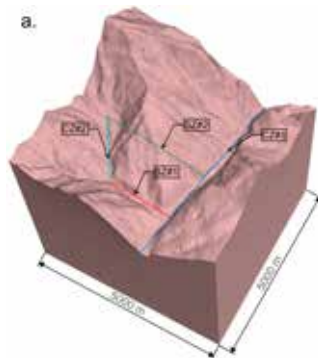


Fig. 3D modelling of in-situ stress state in Upper Tamakoshi Project, Nepal

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Applicability of unlined/
shotcrete lined high
pressure tunnels for
hydropower projects in
the Himalaya

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