

## **Application of the Electrical Resistivity Tomography and Tunnel Seismic Prediction 303 Methods for Detection Fracture Zones Ahead of Tunnel: A Case Study**

**Authors :** Nima Dastanboo, Xiao-Qing Li, Hamed Gharibdoost

**Abstract :** The purpose of this study is to investigate about the geological properties ahead of a tunnel face with using Electrical Resistivity Tomography ERT and Tunnel Seismic Prediction TSP303 methods. In deep tunnels with hydro-geological conditions, it is important to study the geological structures of the region before excavating tunnels. Otherwise, it would lead to unexpected accidents that impose serious damage to the project. For constructing Nosoud tunnel in west of Iran, the ERT and TSP303 methods are employed to predict the geological conditions dynamically during the excavation. In this paper, based on the engineering background of Nosoud tunnel, the important results of applying these methods are discussed. This work demonstrates seismic method and electrical tomography as two geophysical techniques that are able to detect a tunnel. The results of these two methods were being in agreement with each other but the results of TSP303 are more accurate and quality. In this case, the TSP 303 method was a useful tool for predicting unstable geological structures ahead of the tunnel face during excavation. Thus, using another geophysical method together with TSP303 could be helpful as a decision support in excavating, especially in complicated geological conditions.

**Keywords :** tunnel seismic prediction (TSP303), electrical resistivity tomography (ERT), seismic wave, velocity analysis, low-velocity zones

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