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Affect of Reservoir Fluctuations on an Active Landslide in the Xiangjiaba Reservoir Area, Southwest China

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Abstract : Filling of Xiangjiaba Reservoir Lake in Southwest China triggered and re-activated numerous landslides due to water fluctuation. In order to understand the relationship between reservoirs and slope instability, a typical reservoir landslide (Dasha landslide) at right bank of Jinsha River was selected as a case study for in-depth investigations. The detailed field investigations were carried out in order to identify the landslide with respect to its surroundings and to find out the slip-surface. Boreholes were drilled in order to find out the subsurface lithology and the depth of failure of Dasha landslide. The in-situ geotechnical tests were performed, and the soil samples from exposed slip surface were retrieved for geotechnical laboratory analysis. Finally, stability analysis was done using 3D strength reduction method under different conditions of reservoir water level fluctuations and rainfall conditions. The in-depth investigations show that the Dasha landslide is a bedding rockslide which was once activated in 1986. The topography of Dasha landslide is relatively flat, while the back scarp and local terrain are relatively steep. The landslide area is about 29 × 104 m^2, and the maximum thickness of the landslide deposits revealed by drilling is about 40 m with the average thickness being about 20 m, and the volume is thus estimated being about 580 × 10^4 m^3. Bedrock in the landslide area is composed of Suining Formation of Jurassic age. The main rock type is silty mudstone with sandstone, and bedding orientation is 300~310° ∠ 7~22°. The factor of safety (FOS) of Dasha landslide obtained by 3D strength reduction cannot meet the minimum safety requirement under the working condition of reservoir level fluctuation as designed, with effect of rainfall and rapid drawdown.

Keywords : Dasha landslide, Xiangjiaba reservoir, strength reduction method, bedding rockslide
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