Enhancing Rock Slope Failure Predictions During Earthquakes

Rock slope failures during earthquakes pose a significant risk to infrastructure and human safety. This research project aims to assess rock failure complexities stemming from geological variability and seismic uncertainties. The approach encompasses three key components: (1) enhancing direct shear testing methods, (2) conducting shake table experiments, and (3) utilizing advanced numerical modeling techniques.

Standard multi-stage direct shear tests often yield unreliable strength parameters, leading to underestimated friction angles and overestimated cohesion values. To overcome this limitation, the limited displacement multistage direct shear test is implemented, a method that has shown promise in improving strength parameter evaluations. Furthermore, this study extends beyond previous research by subjecting a diverse range of materials to cyclic loading conditions. Laser scanners are employed to characterize specimen roughness, which is integrated into the modeling of direct shear tests. Shake table experiments will be conducted to measure real-time movement and compare with modelled predictions.

This research offers a deeper understanding of rock slopes under seismic loads to aid in improving predictive capabilities. Enhanced direct shear tests and shake table data improve assessments of rock slope stability during earthquakes, advancing risk mitigation efforts.