



Abstract Details

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Title: Study on Technology of Rock Slope Monitoring

Abstract:

NH6 (Landslide Instrumentation and Monitoring) There is an urgent need to prevent disasters by rock slope failures in Japan. Many roads pass near steep rock slopes in Japan, because of the mountainous landform. Rock slope failures sometimes cause serious damage to the traffic, for example, a disaster caused by rock fall at the entrance of Toyohama Tunnel, in Hokkaido, February 1996 (volume: 11,000m³, 20 deaths). It is difficult to prevent disasters due to rock slope failures by structural measures in steep slopes because such failures are usually much larger than surface soil failures, and the measures such as construction of by-pass roads to avoid these rock slopes do not also need high cost but are also time-consuming. Therefore, it is necessary to monitor a rock slope condition, to detect precursor symptoms of rock slope failure and to close the road before failure occurs. This study examines the characteristics of the process of rock slope failure and the validity of various instruments and techniques for rock slope monitoring. Field monitoring tests were carried out at 15 rock slope sites in Japan. Displacement data obtained by extensometer and ground tiltmeter contain fluctuations of one day cycle and one year cycle. Cyclical fluctuations are due to changes of atmospheric temperature, and it can be corrected providing the fluctuations that is clearly correlated to atmospheric temperature. At one of the monitoring sites, actual rock slope failures of toppling type were observed after the displacement had accelerated for several years. Image measurement using digital photographs taken by a fixed camera (8 m distance from rock blocks) had been detected this displacement with the maximum difference of 10 mm, which was confirmed by extensometer data. An increase of the acoustic emission signals and small scale rock falls were also observed before the failures. These phenomena are considered to be useful precursor symptoms of the failures.

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