

SAIEG EVENING LECTURE

Slope Monitoring with Time Domain Reflectometry (TDR)

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Conventional slope monitoring for landslides involves the use of inclinometers, piezometers, and extensometers. The data from these instruments can be collected manually on site, or remotely using an automated data acquisition system (ADAS). The remote system has the advantage of being programmable to trigger alerts if slope movement or water levels reach a pre-determined threshold.

A problem often arises with remote systems when measuring movement as surface and borehole extensometers only provide point data as a particular location in space. To overcome this, it is possible to use chains of electrolytic bubble or accelerometer-based inclinometers in a borehole casing, albeit the cost of such systems becomes astronomical, particularly in deep monitoring holes.

Time domain reflectometry (TDR) allows a complete assessment of a borehole and can locate movement at any depth. It is easily connected to an ADAS system and can provide real-time monitoring and movement alerts.

The system consists of a coaxial cable grouted into a borehole and connected to a reflectometer which supplies an energy pulse to the cable. The time required for the pulse to travel the length of the cable, or to a deformation or break in the cable, is calculated. The depth to any movement can then be determined. The reflectometer can be read manually or remotely via an ADAS.

This presentation describes the various types of conventional instrumentation, explains the principles behind TDR monitoring, and provides case studies where the system has been implemented.

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