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Slope Monitoring Methods

Landslides are known as very dangerous processes of the slope soil movement, which are, commonly, lead to significant damages and losses, destroy homes, communications, and take thousands of people lives. Such consequences could be prevented by slope monitoring.

On the whole, slope monitoring methods respectively measuring devices or sensors can be subdivided into three main categories.

First category, Geodetic Survey, is based on the slope body displacements or movements measured by means of geometrical changes of the site's surface description. Tacheometric total stations, terrestrial laser scanners and global positioning system receivers are involved in this category.

Geotechnical Deformation Monitoring is the next category of slope monitoring methods, which controls the slope movement beginning occurrences, such as cracks development, ground surface inclination and subsurface movements. While the usual methods are still used, two developments known as Time Domain Reflectometry and Intelligent Geosynthetics, which are able to perform as early warning systems, have been invented. The latter method involves combination of a widely used as a soil reinforcing element geosynthetics with a fiber optic material, which is able to determine any geosynthetics stresses.

Geophysical Methods, as the last category of slope monitoring, include recently developed Microseismic and Geoelectrical methods, which are based on a soil parameters and conditions control. Surprisingly, energy releases caused by any changes within a slope are accompanied by acoustic events; their record is at the heart of the Microseismic method. While primarily applied to instabilities in rock slopes, acoustic monitoring has been proven to be useful in soil slides. Another interesting invention, as a basis of Geoelectrical method, is the correlation of geological parameters, such as moisture content, density and others, with soil electric resistivity. The latter is stimulated by simple metal stakes as electrodes without use of boreholes, therefore this approach is also known as non-invasive geoelectrical monitoring, which has found its application in the early warning systems.

Undoubtedly, science advancements in the slope monitoring area in the form of the early warning systems creation is the way of the landslide disaster reduction, thus making our life much safer.