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The use of strain threshold in slope stability trigger action response plans

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Abstract

The measurement of pit slope displacement and the interpretation of subsequent movement and deformation patterns is a well-established industry practice and forms the principal element of a pit slope monitoring program.

The collected displacement data may be interpreted as the total accumulated displacement since the onset of measurement. The average velocity and the velocity delta values (both acceleration and deceleration) can be calculated from the displacement data in order to assist in the identification of slope instability and for the assessment of slope performance.

The strain component of a pit slope, when assessed in the form of the strain criteria for the total or a portion of accumulated displacement, can depict the key stages of instability based on empirical examples from a variety of failure modes and geotechnical settings.

The strain-based approach of assessing slope stability has relied on the traditional strain criteria formula. However, by rearranging the formula to solve the displacement value based on a pre-selected strain percentage and a defined slope height, an indicative displacement value can be applied to proactively evaluate the displacement history of the pit slope. This evaluation can be for a variety of movement and deformation transitions.

It is through this approach that the operation trigger action response plan can be populated to include indicative guidelines for strain threshold alarms utilising displacement measurements as a proxy. The average velocity and velocity delta values can then be determined for hourly or daily limits. This approach allows for a revised strategy for monitoring pit slope performance and instability monitoring and mitigation which incorporates strain.

Keywords: *strain criteria, slope instability, trigger action response plan, relative range, average velocity, velocity delta*

1 Introduction

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6 Conclusion

An overview of the strain criteria and the identification of key movement phases of slope instability and slope deformation patterns was provided. Using this information, in collaboration with the rearrangement of the strain criteria formula to solve for the deformation, or what can be translated as displacement, this allows for the use of these calculated values to be applied in TARPs. Displacement data collected from prism and radar application can be utilised as a proxy to measure displacement for which strain values may be derived to appreciate the strain being accumulated on the surface of a pit slope, which in turn allows for the assessment of slope performance and instability monitoring.

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