

### **Strain-based Approach for Stability Analysis of Earthen Embankments**

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Repeated rapid drawdown (RDD) and rapid rise in water level during extreme events lead to progressive development of plastic shear strain zones within the earth embankments with subtle, rather than obvious, visible signs of distress. The traditional analysis approach within the framework of limit equilibrium method does not account for the accumulated permanent deformation with repeated hydraulic loading within the earth structures associated. A simple linear relationship between the shear strain and deformation at the toe is developed as a function of the geometry of the slope. This relationship provides a simple means to estimate the performance limit state, and the critical shear strain at the embankment toe, using the stress-strain data obtained from triaxial testing. The results from the parametric study show a good agreement with the proposed analytical criterion; in addition, results from the proposed analytical criterion show a good agreement with data from a field study by others.