

The effects of seepage force and the Poisson' s ratio on slope stability

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To predict accurately the timing of shallow landslide occurrence, we need to consider the direction and magnitude of seepage force and earth pressure. A model sandy slope (L: 9m, W:1m, H:4m) was used to measure the hydraulic gradient and seepage force with the tensiometers under the artificial rainfall of 80mm/h. We incorporated not only the seepage force but also the Poisson' s ratio into conventional slope stability analysis by the limit equilibrium method. As a result, the calculated timing of shallow landslide occurrence was almost agree with the timing of that in the experiment and also more accurate than the timing calculated by the Spenser method which took into account the magnitude and moment equilibrium of the force. These results imply that, based on both monitoring at fields and conducting more experiments by a real-size model slope, we need to verify the effects of seepage force and earth pressure as the important factors causing rainfall-induced slope instability.

Keywords: process-based model, Seepage force, the Poisson's ratio, Shallow landslide, Sandy model slope