C14

Three Dimensional Analysis of Rainfall Induced Slope Failure

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Rainfall leads to perched water table development, increasing the main groundwater level and soil erosion due to concentrated water flow. This results in an increase in pore water pressure causing decrease in effective stress in the soil and thus reduces the soil shear strength on the potential failure surface to a point where equilibrium can no longer be sustained in the slope, eventually failure takes place.

Numerical and experimental study has been performed to investigate the mechanism of rainfall induced slope failure. The slope stability analysis has been carried out using the pore water pressure and the moisture content calculated by seepage flow model combined with 2D coupled surface water flow and erosion/deposition model. Extended Spencer method has been incorporated into an effective minimization procedure based on dynamic programming by which the minimal factor of safety and the corresponding critical non circular slip surface are determined simultaneously.

Rectangular flume of length 300cm, width 80cm and depth 70cm set at 24° longitudinal slope was used in the experiment. The model slope was prepared on the rigid bed of flume by placing silica sand S6 on the flume. Three Profile probes (PRs) consisting four sensors (SRs) were used to measure the temporal variation of moisture content and three pressure transducers (PTs) were used to measure the temporal variation of air pressure at different locations inside the body of the model slope. Red colored sediment strips and red colored cotton threads were placed respectively at the side wall faces and inside the body, normal to the flume bed, so as to measure the failure surface after sliding.

Experimental moisture profiles at the position of different SRs are shown in **Fig.1** and experimental air pressure head profiles at the position of different PTs are shown in **Fig.2**.

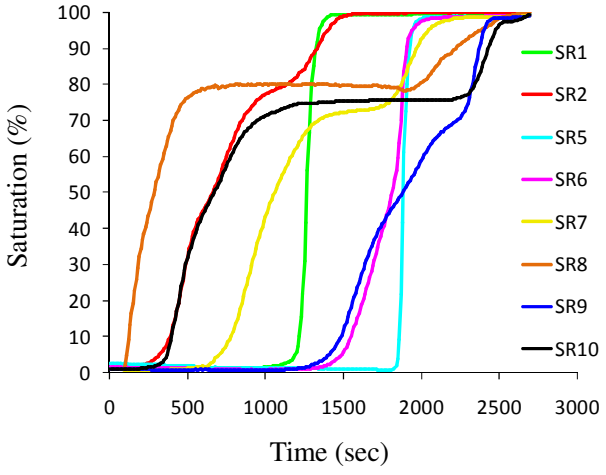

Fig.1 Experimental moisture profiles at the position of different SRs

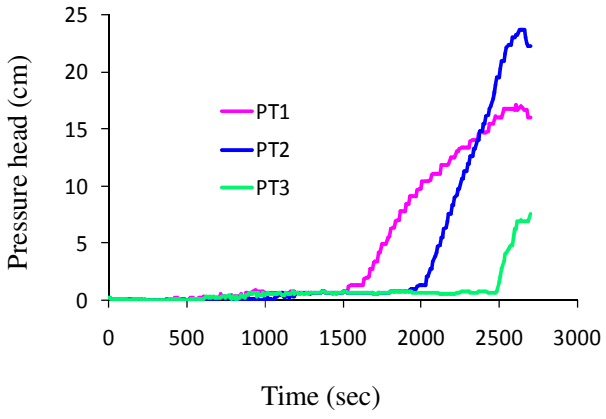

Fig.2 Experimental air pressure head profiles at the position of different PTs