

## 강우에 의한 사면붕괴에 관한 2차원 수치모의

### Two-dimensional Numerical Simulation of Rainfall-induced Slope Failure

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#### Abstract

Heavy storms rainfall has caused many landslides and slope failures especially in the mountainous area of the world. Landslides and slope failures are common geologic hazards and posed serious threats and globally cause billions in monetary losses and thousands of casualties each year so that studies on slope stability and its failure mechanism under rainfall are being increasing attention of these days. Rainfall-induced slope failures are generally caused by the rise in ground water level, and increase in pore water pressures and seepage forces during periods of intense rainfall. The effective stress in the soil will be decreased due to the increased pore pressure, which thus reduces the soil shear strength, eventually resulting in slope failure. During the rainfall, a wetting front goes downward into the slope, resulting in a gradual increase of the water content and a decrease of the negative pore-water pressure. This negative pore-water pressure is referred to as matric suction when referenced to the pore air pressure that contributes to the stability of unsaturated soil slopes. Therefore, the importance is the study of saturated unsaturated soil behaviors in evaluation of slope stability under heavy rainfall condition.

In an actual field, a series of failures may occur in a slope due to a rainfall event. So, this study attempts to develop a numerical model to investigate this failure mechanism. A two-dimensional seepage flow model coupled with a one-dimensional surface flow and erosion/deposition model is used for seepage analysis. It is necessary to identify either there is surface runoff produced or not in a soil slope during a rainfall event, while analyzing the seepage and stability of such slopes. Runoff produced by rainfall may result erosion/deposition process on the surface of the slope. The depth of runoff has vital role in the seepage process within the soil domain so that surface flow and erosion/deposition model computes the surface water head of the runoff produced by the rainfall, and erosion/deposition on the surface of the model slope. Pore water pressure and moisture content data obtained by the seepage flow model are then used to analyze the stability of the slope. Spencer method of slope stability analysis is incorporated into dynamic programming to locate the critical slip surface of a general slope.

**Key Words:** Matric suction, Slope failure, Numerical model, Seepage analysis, Slope stability analysis

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