

FEM Based Numerical Simulation and Analysis of a Landslide Triggered by the Fluctuations of Ground-Water Levels

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Abstract : In this study, the newly developed finite element methods are used for numerical analysis of a landslide triggered by the fluctuations of ground-water levels in different cases I-IV. In case I, the ground-water level is fixed in such a way that the overall factor of safety (Fs) would be greater or equal to 1 (i.e., stable condition). Then, the ground-water level is gradually increased up to 1.0 m for, making the overall factor of safety (Fs) less than one (i.e., stable or moving condition). Then, the newly developed finite element model is applied for numerical simulation of the slope for each case. Based on the numerical analysis results of each Cases I-IV, the details of the deformation pattern and shear strain pattern are compared to each other. Moreover, the change in mobilized shear strength and local factor of safety along the slip surface of the landslide for each case are discussed to understand the triggering behaviors of a landslide due to the increased in ground water level. It is expected that this study will help to better understand the role of groundwater fluctuation for triggering of a landslide or slope failure disasters, and it would be also helpful for the judgment of the countermeasure works for the prevention and mitigation of landslide and slope failure disasters in near future.

Keywords : finite element method, ground water fluctuations, constitutive model, landslides, long-term disaster management system

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