Simulation analysis of failure by rainfall on road slope using DEM

Takahiro Shimizu[1] Makoto Nakamura[2] Tsuyoshi Yamamoto[3] Harushige Kusumi[4]
[1] Graduate school of Kansai University
E-mail : k978224@kansai-u.ac.jp

Abstract

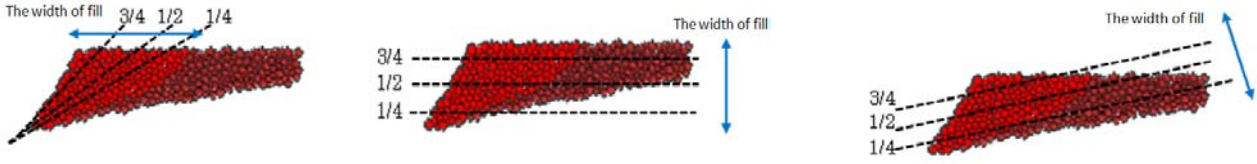
At first, we regarded a decrease of clod strength as decrease of frictional coefficient on this analysis. As a result, we have been able to calculate the decreasing rates of frictional coefficient, and the start speeds. Moreover, we could recognize that collapse soil's distance depends on frictional coefficient, and we could estimate the most dangerous slope among all cases.

1. INTRODUCTION

Recently, examples of slope failure due to rainfall are still constantly being reported. If slope failure that including the road slope occur, it will induce landslides and mudflows. Furthermore, it can be damages to life or property, and to structures such as railways and roads. Therefore, preventive measures to these are socially important issues.

2. EXPERIMENTAL PROCEDURE

Figure1 shows all cases, and setting of water level used in this analysis.Case1 is the drain conditions and drained groundwater from the bottom edge of the fill slope, Case2 and Case3 are the non-drain conditions and groundwater accumulates in horizontal and in parallel directions to slope. Additionally, in this study, for saturated particles, we act the frictional coefficient calculated from the stability formula by Fellenius.



Case1 Case2 Case3

Figure1. Increasing process of groundwater

3. RESULTS AND DISCUSSION

Result of calculating pore water pressure as hydrostatic pressure, frictional coefficient was most decreasing in Case3. Furthermore, it was understand that collapse soil fell a long distance and its start speed were largest in any case of groundwater. On the other hands, in Case1, it was the case that its collapse hardly proceed because unsaturated clod prevents the progression of the collapse.

4. CONCLUSIONS

As a result, when it is heavy rain, we should especially take note it in Case3, and we can say that the possibility of influencing the inhabited area under the slope is high at collapse in Case3.