



Investigation of rainfall-induced failure processes and characteristics of cataclinal and anaclinal slopes using physical models

Chien-Chieh Lin (1) and Chia-Ming Lo (2)

(1) Department of Civil and Disaster Prevention Engineering, National United University, Miaoli, Taiwan (ssps7291@gmail.com), (2) Department of Civil and Disaster Prevention Engineering, National United University, Miaoli, Taiwan (cmlo@nuu.edu.tw)

This study employed physical models in an investigation of the processes involved in rock slope deformation and failure due to the infiltration of rainfall and changes in groundwater level. Observations obtained during each stage of deformation and failure were used to explain how gravity deformation varies with groundwater conditions on cataclinal and anaclinal slopes, and infer how rainfall and groundwater influence slope failure. Our results indicate that groundwater level is a crucial factor in the deformation failure of slopes. The failure mechanisms of cataclinal slopes differ considerably from those of anaclinal slopes. The infiltration of surface water and groundwater can have a significant influence on rock layer deformation and the speed of failure. Slope deformation and tension cracks were shown to be precursors to slope failure, due to the fact that they facilitate the infiltration of surface and groundwater and accelerate the development of potential slip surfaces and failure in slopes, thereby enabling large-scale sliding or toppling failure.

Keywords: physical model, rock slope, rainfall, groundwater level.