

Undrained shear behavior of saturated loess at different concentrations of sodium chlorate solution

Fanyu Zhang^{1*}, Gonghui Wang², Toshitaka Kamai², Wenwu Chen²

¹School of Civil Engineering and Mechanics, Lanzhou University, ²Research Center on Landslides Disaster Prevention Research Institute Kyoto University

A series of ring-shear tests was conducted on saturated loess to investigate the effects of NaCl concentration in pore water and desalinization on the shear behavior under undrained conditions. The loess samples taken from a loess area with frequent occurrence of landslide in China were saturated by de-aired water with different concentrations of NaCl solution, and then were sheared undrained. After that, the samples were retrieved, remoulded, re-set into the shear box, and re-saturated by passing through de-aired distilled water (such that the samples were desalinized), and then were sheared undrained again. Through comparing the undrained shear behavior, the effects of NaCl concentration in the pore-water and desalinization on the undrained shear behavior of loess were examined. The results showed that the variation of NaCl concentration in pore water can strongly affect the shear behavior of saturated loess. Both the peak shear strength and steady-state strength increased with increase of NaCl concentration until a certain value, after which they decreased with further increase of NaCl concentration. Meanwhile, the peak shear strength and steady-state strength of the retrieved samples recovered to those of the original sample, namely the salinization of loess is recoverable. These findings may be of practical importance to better understanding the repeated occurrence of some irrigation-induced loess landslides in China.

Keywords: sodium chlorate solution, loess landslide, undrained shear behavior, irrigation