Geophysical Research Abstracts, Vol. 9, 05125, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05125

Study on mobility of earthquake induced landslides in silty soils by means of ring-shear apparatus

J. Jurko, K. Sassa and H. Fukuoka

Research Centre on Landslides, Disaster Prevention Research Institute, Kyoto University, Kyoto, Japan, (jurko@landslide.dpri.kyoto-u.ac.jp / Fax: +81-774-38-4300 / Phone: +81-774-384106)

Earthquake induced failures of saturated soil slopes may result in rapid, long- traveling landslides or flow type failures. Many of them result from liquefaction phenomenon and have potential for destructive consequences. Laboratory undrained cyclic behavior of non-plastic and low-plasticity silts assumed on a predetermined sliding surface has been studied by means of undrained cyclic torque-controlled ring shear tests. The effects of clay particles on the cyclic and post-cyclic behavior of silty soils was investigated to assess the liquefaction potential and cyclically induced deformation over the range of gentle slopes. To better understand undrained cyclic behavior of silt governed by a little change of clay content, five different silt mixtures were achieved by mixing of non-plastic silt with 0, 10, 20, 30 and 40 % of kaolin clay respectively. Thus, an attempt was made to carefully examine effects of adding little amount of kaolin on cyclically loaded silt. In addition, potential of unlimited deformation associated with liquefaction phenomenon was analyzed. Six different initial static shear stresses corresponding to the interval of slope angles from 0˚ to 25˚ were examined. These tests were conducted to simulate field conditions prior to earthquake with initial static shear stresses acting on predetermined sliding surface and those, with no initial static shear stresses of level grounds. Liquefaction potential of non-plastic and low-plasticity silts along with potential of either limited or unlimited deformation was evaluated. Furthermore, a gradual loss of mobilized undrained cyclic shear resistance after failure and pore water buildup in relation to a number of cycles was observed. The undrained response of anisotropically consolidated samples to cyclic loading due to propagating shear wave with the constant amplitude revealed the significant effect of the plasticity index on their shear resistance reduction and excess pore water pressure generation

at various initial static shear levels. Test results showed, that an increase in the initial slope gradient at a given confining stress is associated with an increase of the mobilized shear resistance, however the addition of a little amount of kaolin by weight, shifting non-plastic to low plasticity silt, resulted in a decrease of the mobilized shear resistance to unlimited types of failure at higher levels of initial static shear stress, in particular.