

Permanent Deformation of Reinforced Soil Wall during Earthquake

High seismic performance of geosynthetics reinforced soil retaining wall (GRS wall) has not been evaluated properly in current seismic design because a pseudo-static limit-equilibrium approach, which is the same procedure as the conventional gravity type retaining wall, has been also adopted even in the design of GRS walls. In the pseudo-static limit-equilibrium approach, ductile seismic performance of GRS walls can not be taken into account. Therefore, a new performance-based seismic design procedure, which typically evaluates the seismic performance of GRS walls by comparing the earthquake-induced residual wall displacements with the allowable values, shall be further developed. Based on knowledge from a series of shaking table model tests, a simplified displacement prediction method of geosynthetics reinforced soil retaining wall has been proposed. Simulations on the previously conducted shaking table model tests by using the proposed method have revealed that the calculated displacements agreed well with the measured ones although the tests were conducted under the wide variety of testing conditions. A performance-based seismic design procedure considering the ductile seismic behavior of GRS wall has been also proposed in this study. These achievements obtained from this study will contribute to refine design guidelines of the conventional type retaining walls and GRS walls. Moreover, further research on the development of performance based design methodology of the earthstructures and retaining structures will be also carried out with reflecting the achievements of this study.

Keywords : reinforced soil retaining wall, seismic design methodology, earthquake-induced residual displacements, development of performance-based design procedure