

Preface

A large number of landslides can be induced by a strong earthquake, and they can cause very serious damage to both lives and properties. Much research has been carried out, and a series of countermeasures have been developed to reduce the adverse effects of landslide disasters. In the planning and design of countermeasures, it is necessary to analyze the stability of a slope and movement behaviors of a potential landslide under seismic loadings. Therefore, this study focuses on analysis of (1) slope stability and (2) landslide movement behaviors.

In the study of slope stability, tension-shear failure mechanism of seismic slope is presented. Most solutions for slope stability analysis are derived just based on shear failure mode, although tension failure always exist in earthquake-induced landslides. Thus, how to analyze slope stability according to both shear and tension modes is an important problem. This problem is discussed in detail, and both analytical and numerical methods are presented to solve them.

In the study of landslide movement behaviors, long run-out, one of the major behaviors of earthquake-induced landslides, is discussed. Since the mechanism is still not clear, the multiple acceleration model (MAM) is extended on the basis of the so-called trampoline effect. Additionally, a practical numerical simulation program is developed to clarify movement behaviors of earthquake-induced landslides in practical simulations.

Combining these two aspects, slope stability and landslide movement, is an effective way to study the whole process of earthquake-induced landslides. Discontinuous deformation analysis (DDA) is a discrete numerical method that was developed for computing large deformation and large displacement in discontinuous block system. However, the original DDA cannot simulate the cohesive material accurately. This monograph presents an extended DDA that can accurately simulate the failure behavior of cohesive-frictional material by using an additional evaluation of edge-to-edge contact. Several examples are performed to illustrate the accuracy, and a real landslide case is studied to clarify the whole process of earthquake-induced landslide.

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