# 論 文 の 内 容 の 要 旨

論文題目　A study on seismic residual displacements of rock fill dams for their performance-based design by 1-G model tests and hollow cylindrical torsional shear experiments（フィルダムの性能設計のための地震時残留変形予測に関する模型振動実験とくり返しせん断実験）

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In recent decades, the importance of researches about seismic performance of such geotechnical structures as retaining walls, embankments, earth fill dams and abutments, are increasing. The main reason is to obtain a better design solution which meets appropriate performance objectives that were determined before starting the design, which is called as performance based design. This design method let the engineers to design in a safe but more economical way. In this design methodology, residual displacement of the structures and choosing the damage level that will be used in the design are the key parameters.

In this research, seismic performance and residual displacements of earth fill dams are aimed to be assessed. For this purpose shaking table model tests were performed. There are not so many experimental studies that also consider the effect of reservoir. Therefore in this study also the reservoir effect was modeled in shaking table tests. Performance of two different types of dams was investigated. One of them was a dam with central impervious core and the core was modeled by Kibushi clay. The other one was an asphalt or concrete facing dam in which face lining was modeled by using a rubber membrane. In both models dam body was modeled by Toyoura sand with a relative density of 70%. The model experiments on central core dam experiments were performed by employing the relative density of the dam body as 70%, 50% and 20%. Seismic motion was applied by increasing the amplitude of shaking from 0 to 500 Gal gradually.

No displacement was observed in the model in which membrane was used as a cover material on the slope face of the upstream part. In the case of a central core observed displacements increased with the decrease in relative density. The displacement values observed in the downstream were less than the upstream, because the existence of pore water in the upstream caused the grater deformations.

As a result of 1-G model tests it was shown that asphalt or concrete lining dam has a performance that is better than a dam with a central impervious core. In central core dam model, greater deformation was observed with the decrease in relative density. The importance of the degree of compaction during construction of fill dam was thus proved.

Another objective of this study is determining residual displacements more precisely to be able to make a good prediction that enables engineers to design more economically and safely. Numerical analyses were performed to find out the stress conditions during static and dynamic conditions in an imaginative fill dam, and then the determined stress conditions were applied to specimens by hollow cylindrical torsional shear tests. Elastic modulus and Poisson’s ratio values were modified by using results of

torsional shear tests and residual deformations of the imaginative fill dam were estimated by linear elastic analysis. As a result, simulating the field conditions more realistically in the laboratory allows us to predict the deformations more precisely and to understand the behavior of the geotechnical structure during an earthquake more clearly.