Improvement of Disaster Mitigation Technology by Functional Cooperation of Existing Seismic Test Facilities

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【Outline of survey】

In order to determine the seismic performance of structures properly, it is important to know the dynamic behavior of the structural systems in the process of collapsing. However it has been difficult to evaluate the behavior quantitatively because not only civil infrastructures are very large but also the collapsing is essentially chaotic behavior. In this study, simultaneous shake table tests of a group of small/middle-scale test specimens are conducted at a large-scale test facility and the dynamic response data of structural components in which the same dynamic input is guaranteed are obtained in the process of collapsing. The other topic of this study is the development of multi-scale multi-physics hybrid simulation by cooperation of small/middle-scale test facilities in order to evaluate the dynamic behavior of large-scale structural systems. The response of the structural system by the hybrid simulation is validated by the results of a large-scale shake table test. In addition of large-scale computational method, the characteristics of the disaster mitigation methodologies are evaluated.

【Expected results】

By advancing the knowledge of dynamic behavior of structural systems in the process of collapsing, not only the seismic design method can be improved by considering the response variance in the process of collapsing but also the discussion of the safety of structures against unexpected large earthquake inputs can be opened. And the disaster mitigation methodologies can be selected rationally and economically to realize the high safe and secure society.

【References】

・ Yoshikazu Takahashi and Gregory L. Fenves. Software framework for distributed experimental-computational simulation of structural systems, Earthquake Engineering and Structural Dynamics, Vol.15, No.1, pp. 21-30, 2006

【Term of project】 FY2007－2011	【Budget allocation】3,500,000 yen (2007 direct cost)

【Homepage address】 http://wwwcatfish.dpri.kyoto-u.ac.jp/~yos