Large-scale Shaking Table Tests for High-rise Buildings
- A New Challenge of e-defense -

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Abstract

Stimulated by the 1995 Kobe earthquake, the Government of Japan decided to establish a large experimental facility for the advancement of earthquake engineering. Along this effort, the National Research Institute for Earth Science and Disaster Prevention (NIED) administered the construction of a shaking table facility, known as E-Defense. Already, E-Defense conducted a series of shaking table tests for various types of structures. Meanwhile, observing the pattern of the previous earthquakes, Japan is most likely to be hit by a next large ocean-ride earthquake by the middle of this century. One serious concern about such quake is long-period, long-duration shaking that would hit large cities. The long-period ground motion may produce very large floor responses, characterized by large velocities and displacements, to hundreds of high-rise buildings. The structures may also sustain a number of cyclic inelastic deformations. In new projects of E-Defense, substructure test methods were developed for the large-scale tests of high-rise buildings. Focusing on the structural performance, a steel moment frame having real connection details was tested with a new test system. A number of cyclic deformations were applied to the test frame in long period ground motions. The capacities of the beam to column connections were identified in term of cumulative inelastic deformation. The other shaking table test was set focusing on the safety of rooms. Contrast between prepared rooms and unprepared rooms were physically produced and successfully recorded in the videos. The edited video files are now opened at the NIED web site. The data on both structure and room begins to practically contribute to the Japan's society.