

Earthquake Disaster Engineering Research Laboratory

Staff	<ul style="list-style-type: none">• Professor Taiki SAITO (E-mail : tsaito@ace.tut.ac.jp)• Assistant Professor Kazuhiro HAYASHI (E-mail : hayashi@ace.tut.ac.jp)
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Working toward the earthquake disaster mitigation of buildings and urban structures, and the promotion of international cooperation.

Faced with frequent earthquakes, everyone must have wondered at some point about whether the town and buildings in which they live are truly safe in regard to earthquakes and tsunamis. In order to alleviate these concerns and reduce the impact of such disasters, there is a requirement for specialists such as ourselves to transmit accurate information out into society. Furthermore, enhancing the seismic safety of structures is extremely important work that demonstrably contributes to the saving of lives. This is true regardless of nation or race. The Earthquake Disaster Engineering Research Laboratory conducts research and development into the earthquake disaster mitigation of buildings and urban structures, and then relays these results out into society. We also promote international cooperation, aiming to conduct research that will aid in disaster mitigation both in Japan and around the world.

Theme 1 ▶ Seismic safety of high-rise buildings against long-period ground motions

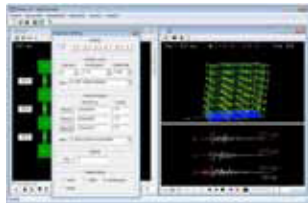
The Nankai Trough Earthquake is highly likely to occur by the middle of the 21st century, and threatens to cause extensive damage to those vital structures that perform core city functions. In particular, the high-rise buildings with long natural period have a quality to resonate with long-period ground motions. Therefore, the repeated shaking carries the risk of increased structural damage, movement & falling of interior furnishings, people becoming trapped in elevators, and ceiling panels falling. We are therefore conducting comprehensive investigations into the seismic safety of high-rise buildings against long-period ground motions.



The threat of long-period ground motion shaking high-rise buildings

Theme 2 ▶ Experiments and analysis concerning earthquake and tsunami safety of buildings

There is a requirement to enhance the seismic safety of cities and buildings in response to the threat of massive earthquakes or tsunamis with an epicenter in the Nankai Trough. We are therefore conducting the experimental practice of structural engineering and the monitoring of strong earthquake observations of foundations and structures to clarify the actual phenomenon that occur. Moreover, we are using precise earthquake response analysis methods for the research to quantify the response and damage characteristics of buildings to large earthquakes and tsunamis from the perspectives of safety, retention of function, and reparability.



Development of earthquake response analysis software

Theme 3 ▶ Development of post-earthquake health monitoring techniques for cast-in-place reinforced concrete piles

Any structure that experiences a major earthquake may still, at a glance, appear to be solid and sound, but could actually have suffered severe damage in locations that cannot be visually confirmed. In particular, the cast-in-place reinforced concrete piles used in the construction of large buildings have suffered severe damage in many cases, including crushing of the underground concrete, but current technology does not provide a way to evaluate their damage without excavating the surrounding ground and performing a direct visual inspection. We therefore focused our attention on the changes in the vibration characteristics of a building that accompany damage to its piles, and aim to exploit this to develop safety evaluation techniques that do not require any soil-foundation excavation.



A pile and foundations fracture experiment using a big shaking table