

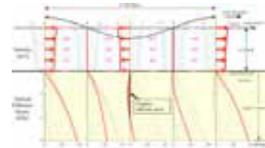
GeoMechanics Laboratory

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Laboratory URL	http://www.geomech.tutrp.tut.ac.jp/
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GeoMechanics Group Laboratory has studying the stability of soil structures and structural foundations, the disaster mitigation, and the geotechnical environment. The stability of structures that residential areas and public facilities such as roads, bridges and ports are important under severe external actions including earthquake, tsunami, heavy rain, and typhoon, is a pressing issue of civil structures for the safety and sustainability of residents lives. The geotechnical environment is also important for it, just as the atmosphere and the ocean. We are continue studying of geomechanics to resolve the issues related to these areas and propose new technologies.⁹⁷

Theme 1 ▶ Scour mechanisms of seabed due to ocean waves and the stability of coastal structures

The study on the scour of seabed around coastal structure due to ocean wave has focusing on the tractive force by shear stress in surface seabed. On the other hand, the instability of seabed that is decreased of the vertical effective stress by acting the change of water pressure in the seabed during ocean wave is known. Our study clarify the mechanism of scour phenomenon with the synergy effect between the tractive force and a change in vertical effective stress due to ocean wave, and also is investigate for effect of stability of coastal structures.⁹⁵



Investigation of scour phenomenon among interaction between tractive force and seepage force due to ocean wave by explicit solution

Theme 2 ▶ Design and construction method for economical pile foundations with short construction time for signs

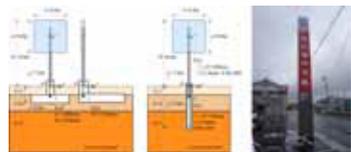
The foundations for signs and traffic signs are almost all gravity type, using a large volume of concrete. However, not only does concrete require considerable time for strength development, but construction processes include excavation, form construction, reinforcement work and water replacement. The results will be a number of potential problems, such as a prolonged work period or lack of skilled personnel. In order to resolve these issues, our laboratory has developed a design and construction method for pile foundations. This research is supported by three technologies; “our uniquely developed deflection analysis technique for a pile that can adapt to layered ground,” “our uniquely developed compound structure for the support pillar and the pile” and “a construction method for a pile that forms a soil improvement.”¹²⁵



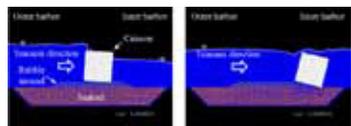
Experimental study on scour and erosion in wave-making channel

Theme 3 ▶ Stability of coastal structures against earthquake and tsunami

Coastal structures have occurred catastrophic damage from earthquakes and tsunamis. However, the mechanism of the tsunami disaster for the coastal structure has not yet been completely revealed. Our laboratory is studying the seismic and tsunami disaster of coastal structure focusing to how the multi-scaling problems and multi-phase interactions among the soil and water affect structures, based on centrifuge tests and smoothed particle hydrodynamics simulations with external force-soil-structure interactions, and research the countermeasure and design methods based on the fracture control design.



Design-construction method for economical piled foundations with short-term construction for signs



Estimation of damage to caisson-type breakwater induced by tsunami with particle based method