深地科学论坛（第二十四讲）：深地科学前沿热点问题探究

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地点：腾讯会议直播（ID 号： 718 317 6634）

报告人	报告人单位	报告题目
張　鋒	日本国立大学法人 名古屋工業大学	Formation mechanism of décollement (海底水平大断層的形成機理)

欢迎全校教师及同学参加！

深部岩土力学与地下工程国家重点实验室

深部地下工程学科创新基地

《深地科学（英文）》

江苏岩土力学与工程学会

力学与土木工程学院

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报告人简介：

Dr. Feng Zhang is the professor of Nagoya Institute of Technology (NIT, National University Association, Japan) since 2005 and is also a Concurrent Professor of Tongji University since 2006. He got Ph.D. degree from Kyoto University in 1995. He served as the head of Civil Engineering Department of NIT during 2006 to 2008 and the director of Advanced Disaster Prevention Engineering Center of NIT during 2011 to 2014. He has published more than 130 top-level journal papers and is the recipient of the awards including the Best Paper Medal of Soils & Foundations (2002, 2011) and the Best Paper Medal of Japan Society of Civil Engineers (2007). His main research fields are Soil Mechanics; Rock Engineering; Seismic Engineering (Large Category) and the detailed research topics at current time are as follow:

- Constitutive modeling for saturated/unsaturated soils, soft rock and cemented treated soils
- Seismic evaluation of earth structures, Pile foundation, and soil-structure hybrid system
- Numerical analyses in geotechnical engineering
- Geologic repository of high-level nuclear waste
- High-precision modelling for sea bed rock and mechanism of Décollement

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报告摘要:

Formation mechanism of décollement

(海底水平大断層的形成機理)

Initiation of décollement zone in incoming sediments is crucial important to understand the mechanism of plate boundary faulting in subduction zones and consequently it may help to clarify the nature of seismogenic zone. However, the basic mechanism and dynamics during the initiation and the evolution of the plate boundary décollement zone remain poorly understood. It is therefore assumed that cyclic loading both in isotropic and deviatory stresses due to earthquake, might cause a dramatic change in fabric and physical properties of the sediments. In this research, at first, semi-lithified trench-slope siltstone from the Boso Peninsula, Fujinomori clay and marine sedimented clay are tested with static/dynamic loads under high confining pressure. Meanwhile, anisotropy of magnetic susceptibility (AMS) of the tested samples is also measured to check the changes in micro structure of the specimens after these tests, from which it is conformed that the macro-micro characteristics of geomaterials subjected to static/dynamic loads can be uniformly investigated. Then the tests are also conducted on seedbed rock samples from proto-décollement zone/décollement zone to verify the formation mechanism of décollement based on the assumption given by the authors. Meanwhile, numerical tests using finite element-finite deformation scheme (FE-FD) based on a sophisticated constitutive model with soil-water full-coupled technique are conducted to simulate the full process of the oceanic plate subducting beneath the continental plate. Particular attention is paid to the influence of shear deformation happened in the subduction, the dynamic force-propagation due to earthquake on the formation of the décollement zone, and the change of volumetric strain of the proto-décollement/non-décollement. Significant compressive volumetric strain was identified when the seabed rocks are subjected to periodic earthquake loadings during 1600 years with a re-occurring period of every 200 years. Amazingly, in spite of the fact that more than 5% of the volumetric strain, the structure of the seabed rocks within the proto-décollement zone remains undisturbed, which is quite similar to the micro-structural characteristics of décollement zone (high density and random fabric). In other words, the repeated dynamic load due to earthquake is apparently the main reason of forming décollement. Yet the verification of this phenomenon is still under way.