

研究発表会の記録 2018年11月22～24日

31th KKHTCNN Symposium on Civil Engineering

Campus Plaza Kyoto, Kyoto, Japan

木戸 隆之祐

KIDO, Ryunosuke
博士課程三年

宮崎 祐輔

MIYAZAKI, Yusuke
博士課程三年

木村 鴻志

KIMURA, Koshi
修士課程二年

田窪 堯

TAKUBO, Gyo
修士課程二年

草場 翔馬

KUSABA, Shoma
修士課程二年

**DARMANTO
Budi Luhur**

修士課程二年

**Teshoukong
Agendia**

修士課程二年

**SAWADOGO
Christian**

修士課程二年

2018年11月22日から11月24日まで、キャンパスプラザ京都(日本)で31th KKHTCNNが催された。本会議は京都大学 (Kyoto University), 韓国科学技術院 (Korea Institute of Science and Technology), 香港科技大学 (Hong Kong University of Science and Technology), 同済大学 (Tongji University), チュラロンコン大学 (Chulalongkorn University), シンガポール国立大学 (National University of Singapore), 国立台湾大学 (National Taiwan University)の計7大学により開催される国際シンポジウムである。シンポジウムは地盤系, 構造系, 環境系の3つのセッションで構成されており, 本研究室では地盤系セッションにおいて, 表1に示すタイトルで研究発表を行った。以下では発表時に頂いた質問と回答の内容を記載する。

表1 発表論文タイトル

<p>木戸 隆之祐</p>	<p style="text-align: center;">[Track 4 Geotechnical Engineering 3]</p> <p>Relationship between pore volume and degree of saturation in partially saturated sand using Voronoi tessellation</p>
<p>宮崎 祐輔</p>	<p style="text-align: center;">[Track 5 Geotechnical Engineering 4]</p> <p>2D FE analysis of seismic behavior in culvert longitudinal direction of precast arch culverts considering structural connectivity</p>
<p>木村 鴻志</p>	<p style="text-align: center;">[Track 4 Geotechnical Engineering 1]</p> <p>Visualization of pull-out behavior of reinforcement material under various triaxial stress conditions by X-ray CT and image correlation</p>
<p>草場 翔馬</p>	<p style="text-align: center;">[Track 5 Geotechnical Engineering 7]</p> <p>Centrifuge model tests on mechanical behavior of steel pipe sheet pile foundation under lateral loading</p>
<p>田窪 堯</p>	<p style="text-align: center;">[Track 4 Geotechnical Engineering 5]</p> <p>Numerical simulation of internal erosion during gas production from methane hydrate-bearing sediments</p>
<p>Budi Luhur Darmanto</p>	<p style="text-align: center;">[Track 5 Geotechnical Engineering 6]</p> <p>Dynamic performance analysis of multiple two-hinged precast arch culvert subjected to The 1995 Great Hanshin earthquake motion</p>
<p>Teshoukong Agendia</p>	<p style="text-align: center;">[Track 4 Geotechnical Engineering 1]</p> <p>Assessment of liquefaction strength of soil considering air bubble injection as a countermeasure</p>
<p>Sawadogo Christian</p>	<p style="text-align: center;">[Track 5 Geotechnical Engineering 8]</p> <p>A study of belled pile design: comparison of centrifuge model tests and FEM analysis on uplift capacity</p>

木戸 隆之祐 (D3)

* 質問された内容

From Dr. Wuwei, Mao from Taiwan University

Q: How did you confirm the levels of suction are different even if the degree of saturation is the same?

A: I applied suction by water head difference between top of the specimen and water table in the burette. If I applied a certain level of suction, the drainage starts and will stop at equilibrium between imposed suction and degree of saturation. I measured the amount of drainage and the water head difference at the equilibrium and then I confirmed that the water head differences are different between drying and wetting processes even if the degrees of saturation are similar to each other.

From Mr. Sangmin Lee from Korea Advanced Institute of Science and Technology

Q: Why the suction levels are different between drying and wetting processes? Is your test reasonable?

A: I think this result is reasonable. This is due to the difference in the curvature of pore water and contact angle of pore water between pore water and soil phase during drying and wetting processes. This is a natural characteristic of partially saturated sand.

* 質問した内容

Track 4 Geotechnical Engineering 1, November 22, 13:30 – 15:15

NTU-12 [The Effect of cyclic loading on monotonic stress-strain behavior of saturated granular materials]

Q1: Basically, in laboratory test, we intend to make homogeneous specimen. In your case, fines content includes 70% in the sand specimen, which makes more difficult to make specimen homogeneous. How did you make homogeneous specimen and how did you confirm homogeneity?

A1: Before making specimen, I mixed coarse sand and fine particles and put water with water content of 20%. Then, I was tamping the sands with 6 layers of the same mass with each other. Due to this procedure, the specimen may be homogeneous, but I couldn't check it in detail. In the future, I need to scan inside the sand to confirm whether or not the sand is homogeneous.

Q2: How many cases did you perform with the same test conditions and could you confirm the reproducibility of experiments?

A2: Actually, I performed firstly cyclic loading and then static loading for saturated sand was done. That's why I didn't repeat the cycle of the tests and didn't do many tests with the same conditions. In the future, I will check it.

*感想

今回は京都開催で、口頭発表だけでなく学生アルバイトとして携わった。写真係として各会場を徘徊したことで、普段は見ない橋梁工学や材料工学の分野に関する研究の発表も聞くことができた。最後の晩餐会で乾杯する際、各大学の Coordinators が法被を、杉浦教授は袴姿を身に着け、酒樽を割る「鏡開き」が行われ、大いに盛り上がっていた。本学会で修士課程二年のブディ君が優秀発表者賞を受賞し、先輩として嬉しく思う。

宮崎 祐輔 (D2)

*質問された内容

From Prof. Louis Ge, National Taiwan University

Q: Do you have a plan to apply the developed numerical method to the actual construction?

A: Yes, I have. We will apply this method to the damaged three-hinged arch culverts due to the Tohoku Great Earthquake. Through the analyses, we will verify the damage mechanism of the arch members based on the comparison of the damage observation and the stress analysis due to the culvert longitudinal earthquake.

From Assoc. Prof. Tirawat Boonyatee, Chulalongkorn University

Q: What is the difference between the examples of the damaged arch culverts such as the displacement hinge, the deformation of the mouth wall of the culvert or continuous tips of the arch members?

A: First of all, the construction design of these damaged arch culverts was common. However, the explainable causes of the deformation of mouth wall and the displacement of the hinge seems to be correlated with the uneven overburden of the culverts. About the continuous damages of the arch members seems to be explained by the longitudinal structural connectivity of the arch members and the longitudinal inertial force..

*質問した内容

Track 5 Geotechnical Engineering 4, November 22, 15:30 – 17:15

TU-40 [Design and application of a mechanical loading system for a deeply-buried water-conveying

shield tunnel lining test]

Q. How do you apply a series of discussion on the damage mechanisms of the shield lining to the actual design construction?

A. We will not have a clear plan of the application to the actual design construction, but in the future, it will be feedbacked to the actual design.

***感想**

今回、日本開催ということもあり、研究発表は勿論、運営側のお手伝いとしても参画させて頂いた。普段、何気なく参加している国際学会も、当日スタッフとして環境整備にあたる、運営側の面白さも経験することができ、非常に楽しい二日間であった。今後も沢山の経験を積んでいきたい。

木村 鴻志 (M2)

***質問された内容**

From Prof. Dong-Soo Kim, Korea Institute of Science and Technology

Q: In your experiment, dilatancy might generate. In this situation, volume increasing will occur. You measure this point?

A: In my experiment, I didn't measure the volume change. But, I can measure by using X-ray scanning, so I will measure in future experiment. And, in my opinion, judging from soil deformation vector, soil deformation is occurred in limited area, so volume change in a whole specimen may not occur.

From Suched Likitlersuang, Chulalongkorn University

Q: In your experiment, to scan CT image, you left for 1 hour. In this situation, between before scanning and after scanning, soil structure might be changed. How you think in this point?

A: From load-displacement relationship, force occurrence trends were not changed, even if I stopped pull-out. In addition, from soil deformation vector, deformation is occurred in limited area and, in almost all area, soil is remained. From these results, I think that even I stop and leave soil in strong confining pressure for an hour, soil structure will not be affected and changed.

***感想**

初めての国際学会であり、英語で自分の研究を伝え、また相手の質問に正確に答えることの

難しさを実感した。また、他大学の学生の研究へのモチベーションや各人の持つ問題意識などを知ることができたのは非常にいい経験であった。懇親会においては新たな友人を得ることもでき、とても有意義な時間を過ごすことができた。

草場 翔馬 (M2)

*** 質問された内容**

From Assis. Prof. Mai Sawada, Kyoto University

Q: Although the mortar is used for the filling material of joint part in actual structure, you used the epoxy adhesive for the filling material of joint part in your SPSP model. And there are some epoxy adhesives, I mean other type of epoxy adhesive you can consider. In your research, how to decide that epoxy adhesive for the filling material?

A: Actually, I think that it's better to confirm the mechanical property of some epoxy adhesives compared with the mortar before I decide the filling material. However, as shown in this figure of the model, the space of the joint part in this model is so small and the length is 500 mm. That's why it's difficult to inject filling material to the joint part completely and I give priority to fill the material in the inside of this model. So, I decided this epoxy adhesive which can be filled in joint part. In addition to this, I think the most important thing is to confirm the mechanical characteristics of joint part of the model including the filling material compared with the full-scale model.

*** 感想**

今回、初めて国際学会で研究内容を発表する機会を頂いた。アジアの大学のみで構成される大学であったが、日本同様に災害によく見舞われる国ばかりということもあり、土木分野への関心の高さや研究の重要性を再認識させられた。研究発表では、皆が流暢な英語で発表し議論を交わす様子や、明確に研究の主要な点が伝わる発表から、多大な刺激を受けた。自身の発表では、なんとか英語で発表することができたが、他大学の方から質問が出なかったことや質疑応答の際に説明が冗長になってしまったことから、自身の研究成果や発表手法に反省点を残す結果になったと思う。今後は、本学会で感じたことや質問頂いた内容を踏まえて、研究を進めていきたい。このような機会を準備し、学会後の懇親会も含めて滞りなく進行して下さった方々に、感謝の意を申し上げたい。

田窪 堯 (M2)

* 質問された内容

From Assoc. Prof. Yosuke Higo, Kyoto University.

Q: How do you decide the parameter for internal erosion?

A: I decided from experiment data of Ke and Takahashi. But the test about internal erosion is rare. So the point must be further studied.

* 感想

今回が初めて国際学会で発表する機会であった。日本以外の大学の研究発表に触れることができるのは数少ない機会であり、新鮮であった。特に連成解析を用いている大学があり、計算手法、解析手法等興味深いものが多くあった。他大学の学生は流暢に英語を話し、活発に議論していることが印象的であり、刺激を受けた。自分の発表では質問があまりでなかったもので、うまく伝えきれなかったのではないかと思ひ、悔いが残る発表となった。質疑応答に関しては自分の伝えたいことは伝えることができたが、答えが冗長になり、よりシンプルに答えることができたと思うので、その点については悔いが残った。また研究内容に関しては、内部浸食のパラメータの設定方法や内部浸食の式の見直し等改めて勉強する必要があると感じた。他国の研究に触れ、議論し、発表するという貴重な経験をさせていただいたので、この経験を今後活かせるよう精進したい。

Budi Luhur Darmanto (M2)

* 質問された内容

From Prof. Tirawat Boonyatee, Chulalongkorn University

Q: If we observe the input wave you used, I can see that the sampling rate is particularly low as the wave is not smooth enough. Is there any influence on the analysis result when you change the sampling rate?

A: As we can see in the graphic, the sampling rate of this input wave is relatively low, about 0.01 Hz. And as you predicted, although I do not mention it in this presentation, the sampling rate do affects the analysis result, as the deformation increases along with the increase of sampling rate. Based on the analyses performed, the increase of deformation stops at around 0.001 Hz.

* 質問した内容

Track 5 Geotechnical Engineering 2, November 22, 13:30 – 15:15

NTU-13 [Case study of soil improvement under a rigid pavement airport runway]

Q: You mentioned the usage of grouting material in your hybrid construction. How do your company determine the quality of the grouting works, as I think it is the most significant weak point in your proposed structure.

A: We follows AASHTO and ACI standard to determine the quality of our works.

* 感想

This conference gave us opportunities to interact with researchers from many countries, especially in Asia. It is very interesting that only by joining the session, the trends of researches that is conducted on each country can be observed. The level of researches is also particularly high, as there are some technical words that I have never heard of before, especially on the research about numerical methods. In addition, some researchers are kind enough to give me inputs for my research. Overall, this conference has been an amazing experience.

Teshoukong Agendia (M2)

* 質問された内容

From Prof. Dong-Soo Kim, Korea Institute of Science and Technology

Q: Has there been any field testing or laboratory experiments carried out to verify and confirm your results obtained from numerical calculations?

A: Jaylord et al. (2018) conducted triaxial tests with Bauxite and iron ore fines (IOF) to evaluate the liquefaction strength of the materials. The obtained results were compared with my analysis obtained from numerical calculations and it was noticed that there was some consistency in the liquefaction strength curves in relation to varying degrees of saturation.

* 質問した内容

Track 5 Geotechnical Engineering 7, November 23, 11:15 – 13:00

NTU-10 [Compressibility of cemented binary mixture]

Q: In your calculations as well as experimental procedures, did you take into account the air-water compressibility effect on the mixture before and after stabilization?

A: No, I only considered the effect of water in terms of degree of saturation. However, I will include

the effect of air-water mixture in my future study.

***感想**

I experienced a rich academic exchange through discussions, as well as the questions and answers that followed the presentations of research and innovative works done by researchers in the civil engineering discipline from different universities in attendance. I also had the opportunity to discuss and interact in an informal manner with students from other universities and I made new friends. It was worth attending.

Sawadogo Christian (M2)

***質問された内容**

From Unknown Researcher

Q: I remember from the literature that generally, uplift resistance is considered as 70% of the bearing capacity. From that perspective how do you see your results and your proposed design assessment?

A: J In my opinion, using the 70% relationship can't suit to a practical situation where as an engineer we need to assess the uplift resistance based on some physical properties of the pile and the soil. The 70% might be used as an information, but should not be considered as reference because of the high influence of so many other factors.

From PhD student SHO OGATA from Kyoto University

Q: In the joints parameters that you have used, I noticed that the normal stiffness and the friction stiffness are similar, I think physically, the normal stiffness should be higher than the friction stiffness.

A: I actually agree with your remark. But the fact is that in this simulation, we have considered toyoura sand as in the experiment. The joint parameters should actually change depending on the normal stress. However, we have had to relate the joint stiffness to a study where a direct shear tests of Toyoura sand and mortar has been conducted. But, at the current state of the research, we are trying to relate the stiffness to some other physical properties.

Discussion with Prof. Dong-Soo Kim, Korea Institute of Science and Technology

Q: Pile analysis subjected to uplift is still less documented, how is the Japanese regulations about tension pile design? And which factors do you think, can affect their behaviors?

A: In this study, the analysis and investigations are made under the framework of architectural design.

In Japan, these types of piles are mainly used in the architectural field. At the current state of the research, I know a little about the Japanese regulations, the focus is made on modelling the behavior and to find out the appropriate way to estimate the uplift behavior. As for the factors having influence, I think the first one is the construction method, and the second one is the soil where the pile is enlarged.

***感想**

This conference gave me the opportunity to interact with high level university graduates and professor from various Asian countries. I had the honor to discuss a lot especially with professor Dong-Soo KIM from KAIST during the conference. Another tendency that I noticed is the implementation of artificial intelligence and machine learning in the field of engineering. This opens a lot of opportunities to enhance the investigation methods not only in geotechnical engineering only but in Civil Engineering in General. He showed some interest in my research and we discussed about pile foundation. In the overall, it was also a good opportunity to exchange both in terms of knowledge but also in terms of culture.

Photo Gallery



In this conference, Darmanto Budi Luhur took best presenter award.
Congratulation!!!