Views of Young Geotechnical Engineers

Young Member Award winner: Anders Kullingsjö, Sweden

Personal history:
Born: 01 January 1974
-1997, Chalmers University of Technology, Gothenburg. Master of Science – Civil Engineering.
-2007, Chalmers University of Technology, Gothenburg, Doctor of Technology. Department of Civil and Environmental Engineering, Division of GeoEngineering Geotechnical Engineering

Experience Record:
1998-2005 Skanska Teknik AB: Consultant Geot. Eng.
2005-2009 Skanska Sverige AB: Manager Geot. Eng.

Present position:
Senior Manager / Specialist at Geot. Eng.

Commission of trust:
- Swedish Geotechnical Society, secretary in the west division 1999-2003 and member in the election committee 2003-2006
- Implementation committee of the Eurocodes in Sweden, Member of the steering committee 2005 to date
- Representing Sweden in ISSMGE Technical committee "Limit State Design in Geotechnical Engineering", TC23. 2006 to date

Receiving this award is a great honour for me and an acknowledgement of that the long tradition of geotechnical engineering in Sweden still is in the forefront.

My research presented in my thesis (Kullingsjö, 2007) and in the article nominated to the YMA award, presented in the 17th ISSMGE Conference (Kullingsjö, 2009), deals with the deep excavations in soft clay and how the excavation will affect the immediate surroundings in terms of deformation. The uniqueness of my work is the close cooperation between academia and industry and that an exchange with outstanding universities in some areas made it possible to use highly advanced numerical analysis at a real case in the centre of Gothenburg. The research was divided into Class A predictions of a real case, field monitoring, laboratory testing, calibration of advanced constitutive soil models and Class B calculations with more or less advanced constitutive models. The abstract from the nominated article is presented below:
When excavating in an urban environment, evaluation of the magnitude and distribution of ground movements is an important part of the design process, since excessive movement can damage adjacent buildings and utilities. In order to minimize the movement of the surrounding soil, a retaining wall support system is used to provide lateral support.
This article is a brief summary of the dissertation "Effects of Deep Excavations in Soft Clay on the Immediate Surroundings: Analysis of the Possibility to Predict Deformations and Reactions Against the Retaining System" presented at Chalmers in 2007, (Kullingsjö, 2007). The dissertation describes different methods for the evaluation of ground movements adjacent to a deep excavation in soft clay as well as how to estimate the lateral earth pressure that acts on the retaining system. It presents a review of:
- Soil characteristics of importance for the evaluation of deformations and earth pressure.
- Current empirical methods for estimating ground surface settlements.
- Different classical methods for calculating lateral earth pressure.
- Various soil modelling methods, with focus on the theory of elasto-plasticity.

The review is followed by an extensive case study performed at the Göta tunnel project in the centre of Gothenburg, Sweden.
Back analyses were performed in order to predict and interpret ground deformations and the development of stress changes against the retaining wall system. These analyses took the form of non-linear finite element analyses with three different constitutive models (an isotropic linear elastic Mohr-Coulomb model, the e-ADP, which is a total stress based model capable of modelling anisotropic undrained shear strength as well as non-linearity in shear, and MIT-S1, a bounding surface model based on effective stresses). The different outcomes of these three models are compared and discussed. Special focus has been placed on evaluating the parameters of the MIT-S1 model and its response compared to advanced laboratory tests.

ACKNOWLEDGEMENT
The work has been carried out at the Division of GeoEngineering, Department of Civil and Environmental Engineering at Chalmers University of Technology, with financial support from Skanska, the Swedish National Road Administration, SBUF and the VBT consortium (an industrial consortium financed by Vinnova, SBUF, the universities and the companies where the project took place). The project was made possible thanks to an agreement about openness and cooperation between the Builder, the Contractor and the University regarding working sequences and field measurements at the J2 construction site, which was a part of the Göta tunnel project in Gothenburg. Extensive field monitoring and laboratory testings were made possible as a result of this agreement and financial support. Exchanges and cooperation with other universities, MIT (US), Imperial College (UK) and NTNU (Norway) were a very valuable part of the project.

REFERENCES
Kullingsjö, A. (2007). *Effects of Deep Excavations in Soft Clay on the Immediate Surroundings: Analysis of the Possibility to Predict Deformations and Reactions Against the Retaining System, Chalmers University of Technology*: 334 pp.
Kullingsjö, A. (2009). *Effects of deep excavations in soft clay on the immediate surroundings*. Proc. of 17th International Conference on Soil Mechanics and Geotechnical Engineering, Alexandria, Egypt: 1923-1930.

Views of Young Geotechnical Engineers

Young Member Award winner: Leon van Paassen, The Netherlands

Personal history:
Born: 28 January 1976

Education:
- 2002, Delft University of Technology, MSc – Mining Engineering, Engineering Geology.
-2009, Delft University of Technology, PhD – Applied Sciences, Environmental Biotechnology

Experience Record:
2000-2002, IFCO Foundation Expertise BV – Junior Geotechnical Engineer
2002-2005, GeoDelft – Advisor Foundations and Underground Constructions.
2005-2009, GeoDelft/Deltares – R&D Smartsoils®.
2009-now, Delft University of Technology, Department of Geotechnology – Assistant Professor Geo-Engineering.

Committees
2003-2007 Treasurer Ingeokring (Dutch department IAEG/ISRM)
2008 Organising committee for 1st International Conference on BioGeoCivil Engineering
2009-now, Editorial board Ingeokring Newsletter

It is a great honour for me to receive the Young Member Award 2009 for my publication "Scale up of BioGrout, a biological ground reinforcement method", which I presented during the 17th ICSMGE in Alexandria, 5-9 October 2009. In this paper I describe the experiments that were performed to develop BioGrout – a new ground improvement method based on microbially induced carbonate precipitation – from proof of principle in the laboratory to a field scale experiment, in which equipment, conditions and techniques were applied, which are also used in emphasized applications, such as increasing the stiffness of railroad embankments. First, experiments were performed in a 1 m3 container set-up simulating a spherical injection from a single point, followed by a 100 m3 field scale experiment. In this final experiment 40 m3 of sand was biologically cemented within 12 days and 6 flushes, stretching over a distance of 5 m between three injection and three extraction points. In both scale up experiments significant increase of the average strength was obtained, but distinct spatial variability of the mechanical properties was observed. The heterogeneity is considered to be affected by the induced flow field, the distribution of bacteria, the procedure of supplying reagents (continuous flow or sequential batches) and the crystallization process.
The experiments were part of a research project performed by Deltares, Delft University of Technology and Volker Staal en Funderingen from The Netherlands in collaboration with Soletanche Bachy in France and Murdoch University in Australia and funded by SenterNovem (Dutch Ministry of Economic Affairs). The paper formed a chapter of my PhD thesis, which I defended 20 October 2009.

In my current position as Assistant Professor Geo-Engineering at Delft University of Technology I plan to continue my research in the interdisciplinary field of BioGeoCivil Engineering and develop new ideas based on sustainable concepts found in nature that solve engineering challenges such as resource depletion and reducing the impact on the environment. I aim to embed my research in the geotechnical engineering society by joining the TC 17 on ground improvement and initiate a working group within this on biomediated ground improvement. As I am active at the interface between biogeochemistry and engineering encountering a wide range of materials varying from soft soils to hard rocks it is evident that I support all efforts towards further collaboration between the three sister societies ISSMGE, IAEG and ISRM, through the FedIGS initiative. I hope that in future the boundaries between these closely related disciplines of rock mechanics, soil mechanics, geotechnical engineering, environmental engineering and engineering geology will further disintegrate, as it is mainly due to these cross disciplinary discussions that new ideas are discovered. As a future lecturer I expect to share my enthusiasm about the challenging field of Geo-Engineering and stimulate the young students to actively participate in these international societies e.g. by joining the YGEC or other international conferences in order to exchange their ideas, views and cultures with their fellow students and colleagues from abroad.

Views of Young Geotechnical Engineers

Young Member Award winner: Susumu Nakajima, Japan

Personal history:
Born: 26 April 1978
Education:
- 2000, Tokyo University of Agriculture and Technology
- 2005, University of Tokyo, Master of Engineering
- 2008, University of Tokyo, Doctor of Engineering

Experience Record:
2003-2007; HONMA Corporation, Japan
2008; Researcher, Public Works Research Institute, Japan
It is pleasent surprising and honor for me to be given an opportunity to introduce my research and my views of the international society, future of geotechnical engineering in the ISSMGE Bulletin.

The paper submitted to the ICSMGE2009 was on the effect of shaking history and material properties of geogrid models on the seismic behavior of the gravity type and geosynthetics reinforced soil retaining walls, which was the part of 14-years research achievements conducted by University of Tokyo, Railway Technical Research Institute and Tokyo University of Science, Japan. This research project started at 1995 immediately after the Hyogoken-Nanbu earthquake so as to avoid the catastrophic failure of the retaining structures observed in the earthquake.

This research began with the studies on the difference between the pseudo-static and dynamic behaviors of retaining walls. Next we conducted the shaking table model tests on the conventional and geosynthetics reinforced soil retaining walls so as to investigate into seismic earth pressure and failure plane formation in the backfill layers of the retaining walls. Based on the knowledge obtained from the senior colleague's achievements, I have attempted to develop a displacement prediction method of the retaining walls with considering the effects of subsoil and backfill deformation. In the development of the displacement prediction method and its application to the simulation of the previously conducted shaking table model tests, I had the interests on the effect of shaking history on the seismic behaviors of the retaining structures because most of our model tests were conducted with the step wise shaking. Abstract of the paper submitted to the ICSMGE2009 is as follows. If you have any interests please read it and discussion is every time welcome for me (s-nakaji55@pwri.go.jp).

A series of shaking table model tests on gravity type and reinforced soil retaining wall models was carried out so as to investigate into seismic behavior of retaining walls. In this study, seismic behaviors obtained from the step by step shaking tests were compared with the ones from the tests in which the models were subjected to large amplitude shaking from the beginning (i.e. no effects of the shaking history on seismic behavior). The test results revealed that the shaking histories had a significant effect on the seismic performance of the gravity type retaining walls, while it was not the case for the reinforced soil retaining walls. The former behavior is possibly affected by occurrence of local bearing capacity failure beneath the retaining walls. Effects of material properties of geogrid models (i.e. pullout resistance, rupture strength and tensile rigidity) on seismic performance of the reinforced soil retaining wall were also investigated in this study by using two different types of geogrid models. Even though the material properties of the geogrid models were largely different, seismic performances of the retaining walls were almost equal to each other. This behavior can be explained by considering the difference in the pullout rigidity between the two geogrid models which is not taken into account in the current design procedure.

I need to answer the request to mention my views of the international society and future of geotechnical engineering. First, the ISSMGE gives us the chances to interchange the information and knowledge by organizing many international symposiums and conferences in spite of the difficulty for managing them. These chances are highly valuable for both reseachers and engineers while I personally felt that in the recent international and regional conference, the chances to have the presentations and discussions are reducing. This may be partially because of the enlargement of the ISSMGE, which is one of the achievement, but the chances to be given the constructive comments from the senior researchers and engineers in different countries and discussions are highly valuable for further works. Therefore, I am expecting the ISSMGE to manage this tendency although I understand that the organizing is quite difficult.

Lastly, I think that responsibility of the geotechnical engineering for the society is becoming more important as compared with several tens of years ago, but thanks to the ISSMGE's effort, the cooperative work and integration of the knowledge is also becoming possible. So, I believe that geotechnical engineering continue to contribute to the society in many situations. And I personally feel that I need to learn more from the seniors so as to be a member to contribute the geotechnical engineering.