

**ISSMGE FOUNDATION  
REPORT ON CONFERENCE ATTENDANCE**

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<b>Conference Title:</b> XVI ECSMGE	<b>Location of Conference:</b> Edinburgh UK	<b>Dates of Conference:</b> 2015.09.13-17.

**What you learned:**

The lecture *Geotechnical Engineering for Sustainable Transportation Infrastructure* showed that there are new, environmentally friendly material solutions in earth works of transportation (AG Correia).

The bearing capacity computations of piles is an extensively researched area. Sand ageing may play an important role in stress changes after pile penetration, there are several hypotheses to explain this (R Jardine). The soil improvement and by proper foundation systems are alternatives (D Adam). Some research results on shallow foundations and deep foundations (e.g. Lavasan-Gussmann-Schanz, L Szilvagy).

There is a great need for mathematically precise, automatic non-linear parameter identification methods, e.g. at the evaluation of the standard compression tests in soft clay (I Lungu (Romania) B Westerberg (Sweden)), or at the evaluation of pressure-meter test (C Dalton, Cambridge in situ (UK)), or the CPTu dissipation tests. Recommended changes in EUROCODE and use of EUROCODE (T Orr, A Szepeshazi).

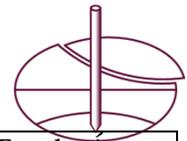
The particle migration phenomena are encountered in several contexts, e.g. internal erosion, segregation due to Frost-Heave effect, clogging of wells (E Bowman (UK), T Shire (UK), V Khomenko (Russia), L Korkiala-Tanttu (Finland), M Preene (UK)). This area can be developed by implementing some new, grading-entropy based criteria of Hungarian origine, I have transferred these some of the interested authors.

Soil freezing was investigated as a fundamental research, in constitutive model framework (G Viggiani).

The latest statistical methods were encountered in landslide analyses, e.g. in the presentation *Probabilistic Slope Stability Analysis in Sensitive Clay Area* (NGI, S Lacasse, Z Liu). These may result in economic solutions.

Deep excavations may have unexpected settlements in soft clay soils by several reasons, as presented by NGI. These are attributed to un-proper anchoring and dewatering, revealed by the presentation on *Causes of Unexpectedly Large Settlements Induced by Deep Excavations in Soft Clay*, and presentation on *Impact of Anchor Failure for Deep Excavation in Soft Clay Based on 3D FEM Analyses* (NGI).

Several interdisciplinary subjects can be mentioned, as the effect of organic compound on



soil bonds (poster of R Herrmann), temperature and rock properties (poster of A Torok, A Torok and P Gorog); the effect of microstructure and bond properties and soil behaviour.

The TC102 meeting had the following agenda.

- a. The recent past events and future collaborations of TC102 in near future events, new members, refreshing of TC102 website, new textbooks on In Situ Testing, Webinars; etc
- b. ISC'5: state-of-the-art and outcomings (presentation of the organizers)
- c. TC 102 Honour Lecture proposal for 19ICSMGE, Seoul 2017, and future JK Mitchell lectures
- d. ISC'6 and following years schedule
- e. Specialty symposia/conferences: CPT/ DMT / PMT, Geophysics (the next CPT conference is planned in Delft instead of USA).
- f. Sub committees on specialty testing equipment/systems
- g. Special publications as follow-up of TC102 events

I participated in TC 102 meeting. The following suggestions were made, among others: (i) I suggested that workshops could be organised in the various subtopics instead of forming subcommittees (e.g. a dissipation test workshop). (ii) I suggested that the publication of the best papers of the previous CPT10, CPT14 and 13th IACMAG conferences could be possible.

TC106 organised an excellent workshop. I think this as a good example for other TC-s.  
Programme:

An Investigation of Climate Effects on Infrastructure Slopes

Paul Hughes, Durham University, UK

Effect of rainfall and vegetation on the stability and serviceability of infrastructure and natural slopes

Aikaterini Tsiampousi, Imperial College London, UK

Effects of plant transpiration on induced suction

Anthony Leung, Dundee University, UK

Recent findings on partially saturated lime treated clays

Maria Mavroulidou, London South Bank University, London, UK

Approximate interpolation of the sand parameters in the function of the grading curve

Emoke Imre, Hungary

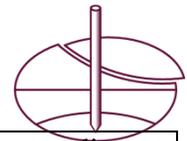
Peculiar behaviour of locked sands interpreted using unsaturated soil mechanics principles

David Mašín, Charles University, Prague

I presented our work in the TC 106 workshop: *Approximate interpolation of the sand parameters in the function of the grading curve*. Some words on it:

Background

The concept of grading entropy has a history partly of Hungarian origine. Dr. Lőrincz elaborated the grading entropy theory in about 1996. He made various tests (minimum dry density, suffosion, filtering) on artificial mixtures of natural sand grains. The results of these were used to give a set of particle migration rules for granular soils (an internal stability rule, a filtering rule and a segregation rule). The grading entropy theory was linked by Dr. Lőrincz with the density of sands and with particle breakage later on, starting a common reseach with Dr. Imre and Mr. Trang. Later Dr. Imre organised a common research together with Dr. Lőrincz, Professor Fityus (University of Newcastle, Australia), Professor Schanz (University of Bochum, Germany), Professor Rajkai (RISSAC, Hungary), with Professor Nagy (BME, Hungary) and Professor Singh (Texas A.M. University, USA). They started to use the



grading entropy theory for interpolation of the sand properties over the space of the grading curves, and to implement the forgoing set of rules for granular soils in practice. A part of the results were summarised in the book of Singh, Vijay P. *Entropy theory in hydraulic engineering: an introduction* (ASCE), 2014

#### Content of presentation

The presentation focused on the following points of the ongoing research of several institutes and universities (shown at the background information): the development of the approximate interpolation method for the grading curves – physical relations using the grading entropy map, the actual determination of grading curves – physical property relations with approximate interpolation, to characterize these relations.

The workshop entailed interesting features and new ideas e.g. on the effect of lime on SWCC and unsaturated constitutive models with new boundary conditions in high level numerical algorithms of Geotechnical Design.

I presented the following papers as posters:

Imre E. , Schanz T., Hortobágyi Zs., Singh V.P., Fityus S. Oedometer relaxation test (MRT)

Imre E, Kecskés G, Rajkai K, Schanz T, Hortobágyi Zs, Singh V.P., Fityus S. Sand behaviour in terms of the grading curve.

Some words on these posters are written as follows.

#### *Oedometer relaxation test (MRT) poster*

##### Background

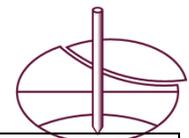
The staged oedometer tests are the conventional oedometric compression test (OCT) with constant total stress load and, the oedometric relaxation test (ORT), with constant displacement load. It is not known whether the multistage oedometric relaxation test can also be used to determine the compression curve, the coefficient of consolidation and the viscous properties of the saturated soils since the ORT has not been applied in a multistage form. These dual tests are the one dimensional species of the point-symmetric tests, the higher dimensional variants are the rheological type cone penetrometer tests (see Table). Therefore, the staged tests can theoretically be used to study the RCPTs which has some significance since the latter are used to determine the in situ value of the coefficient of consolidation (or relaxation) but the non-trivial outer boundary condition in the soil is unclear.

In the research the oedometric relaxation test is investigated and an evaluation method is suggested which can be used for short multistage tests (with fast load imposition and short stages except the last stage). The evaluation method differs from the evaluation methods available in the following ways: (i) the joined model, which is validated, (ii) the inverse problem solution, which is automatic and mathematically precise, includes some reliability testing and regularization methods and (iii) the initial condition, the shape of which is identified. By applying this, the testing time can be reduced from one week to one day with doubled stage number.

The validation study showed that (i) the fitting error decreases to the half for those model-variants where the simultaneous creep/relaxation is taken into account, (ii) the relaxation may qualitatively influence the model response in a parameter dependent way, (iii) the short multistage oedometric relaxation test data can successfully be evaluated, (iv) the test may have some special uses like tension strength measurements of clays and soil fabric energy storage characterisation.

#### Content of poster

The analysis of the consolidation model-pair and the result of the laboratory tests indicate a



difference in the stress state of the samples for the two staged tests and, some possibilities for the special uses of the relaxation test. These are based on two points: (i) the comparison of the MRT and MCT compression curves, the difference may give same information on soil fabric, (ii) the load-unload moduli are different for the soil structure and are the same for the pore water pressure, therefore, unloading may cause negative effective stress at the minimum effective stress point of the sample.

### *Sand poster*

#### Content of poster

The poster presents (on the basis of previous test results) the basic facts that the sand minimum dry density splits in terms of the grading entropy parameters into an entropy increment dependent symmetric part and a unique asymmetric part and, the fact that the minimum and the maximum dry density ratio is about constant.

The poster presents (on the basis of actual test results) that the controlling parameter of the critical state friction angle is a the base entropy parameter (logarithmic mean diameter). It is shown that the compressibility may also show a significant dependence on this parameter.

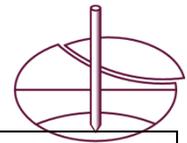
### ***People you met:***

Joek Peuchen (N)	T Lunne NGI
J-L Briaud (USA)	
R Herrmann (Germany)	M Gunn (UK)
John McDougall (UK)	Z Benarczyk
R Frank (France)	J Powell Geolabs (UK)
P Delage (France)	L Korkiala-Tanttu (Finland)
E Alonso (Spain)	M Preene (UK)
D Toll (UK)	E Bowman (UK)
Paul Mayne (USA)	D Basu (Canada)
Antonio Fonseca (Portugal)	A Gomes Correia (Portugal)
H Brandl (Austria)	C Stoewahse (Germany)
I Lungu (Romania)	O Torgersrud (NGI) J Langford (NGI)
B Westerberg (Sweden)	B Westerberg (Sweden)
A Leung, Dundee University, UK	Z Liu (NGI)
L Zdravkovic (IC UK)	S Lacasse (NGI)
R Jardine (IC UK)	V Berhorst Geomil
C Jommi (Delft)	C Dalton, Cambridge in situ (UK)
D Masin (Prague)	F Casini (Italy)

### ***Main features of conference:***

The sessions were well-organised, with a foreign chair and an UK co-chair. Supportive and distinguished environment for conference work from all sides (chair persons, participants, exhibitors etc). Effective knowledge transfer was ensured.

The posters were nicely organised, with simple guidelines to be prepared, the exhibitions consisted of important companies.



***Your comments on the conference:***

Prof Mike Winter, Chair of the Conference Organising Committee and the organising committee made a nice work in Scotland, with a helpful spirit. Beyond the excellent organisation, the topics of parallel sections were attractive. It was possible to see all interesting points, all the technical presentations delivered in the interested topics since the schedules were strictly followed. There were nice posters sessions, technical and cultural visits.

***Please attach short report (maximum 400 words) suitable for publication in the ISSMGE Bulletin:***

The theme of the XVI ECSMGE was the Geotechnical Engineering for Infrastructure and Development. Some main topics treated in sections:

Infrastructure - Roads and Railways

Urban Development and Environment

Parameter Selection

Slope Instability

Hydrology and Hydrogeology

Case Studies, Forensic Geotechnical Engineering and Monitoring

Slopes, Geohazards & Problematic Materials

Environment, Water and Energy

In-situ Testing

Investigation, Classification, Testing and Forensics

Earthquake Geotechnical Engineering and Liquefaction

Modelling

Near Shore and Offshore Development and the Marine Environment

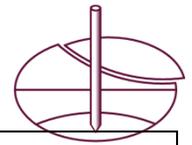
Classification and Laboratory Testing

Dams and Dykes

Some pieces of information and comments are as follows.

Concerning the paper of R. Jardine on sand ageing is a real novelty and some experiences were transferred from my part (Yang, 1956, ASCE, and a personal communications by an engineer, formerly worked in Siberia in several foundation construction projects). According to the experiences, the re-driving resistance of piles driven in sand, considerably increases after a few hours immediately after driving and, because of this, it is almost impossible to drive the piles deeper. After a few days, it decreases - possibly due to the relaxation of the radial normal stress – and it is easier to drive the pile deeper. The first instances are also described by a research article regarding the topic of CPT local side resistance dissipation test (Imre & Bates 2015 Some Comments on Dissipation Testing of the Soils DMT15, 415-422, <http://www.marchetti-dmt.it/conference/dmt15/papers%20DMT%202015%20%28pdf%29/62.pdf#page=1>) reflecting that the local side friction is increasing with time for sands, is decreasing for intact clays (measured with slightly larger shaft element than the present standard, to eliminate the tip effects). The sand behaviour can be attributed partly to ageing, partly consolidation. As a result, the local side friction dissipation test could be useful in soil classification.

Deep excavations may have unexpected settlements in soft clay soils by several reasons, as presented by NGI. In Hungary, some soft, saline clays were recently encountered and a pioneering research programme started between several institutes in relation the ELI project. There are plans to cooperate with NGI by making parallel computations on the deep



excavations at the ELI project in Hungary.

The support of ISSMGE Foundation is greatly acknowledged. It was possible to discuss two accepted papers and the research on particle migration recently published in Entropy Journal. It was also possible to participate in TC102 meeting and TC 106 workshop to represent Hungary and present our sand research in the TC 106 workshop (*Approximate interpolation of the sand parameters in the function of the grading curve using grading entropy*).

