



ALERT Geomaterials

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Summary:

Editorial

page 1

The Association

page 1

New Alert members

page 1

Workshop 2007

page 2

Invited Lecture 07

page 2

School 2007

page 2

PhD prize 2007

page 3

1st Alert Poster
Session

page 4

The soilmodels.info
project

page 4

Alert Workshop and
School 2008

page 4

Invited Lecturer
2008

page 4

EDITORIAL

On behalf of the ALERT Bureau, It is my pleasure to deliver the second issue of the ALERT Newsletter, where you will find some information about the last and the next Aussois meetings, about the new actions we have undertaken and about the organisation of the Association. In particular, about this last

point, please read carefully the section here below, where the role of the General Assembly of ALERT is briefly described. Finally, I invite all of you again to capture the opportunity of this newsletter for advertising scientific activity of your team.

Claudio di Prisco

The Association

According to the Alert Statute, after a transitional period of three years, next year the Association will become adult and the Alert **General Assembly** will start to work. This means that, during the Annual Alert meeting all the Alert members (i.e. professors, researchers, PhD students and permanent staff of Alert Institutions) will be invited to participate to a meeting during which the annual program of the Association will be presented and discussed. Every three years during the **GA**, the members of the Board of Directors will be elected. All the members of **GA** are eligible.

The role of the General Assembly has been already described in the 12th Article of the Statute that we report here below.

ARTICLE 12

1. The ordinary General Assembly, composed by all the members of the association, is called at least once per year, under request of the President, of the Board of Directors, or of ¼ of the members.

2. Convocations must be sent at least one month before the chosen date.

3. The agenda of each meeting is chosen by the Bureau after consultation with the Board of Directors.

4. Only points listed in the agenda can be discussed.

5. All decisions are taken by the majority of the active members, present or validly represented. Deliberations have to be recorded in a register, signed by the President and by the General Secretary.

6. Extraordinary General Assembly may be called by the President or by the ¾ of the active members.

7. In order to take valid decisions, the General Assembly must respect the same criteria of the Board of Directors as far as the quorum and the number of present or represented member is concerned.

Since Alert is like a large box which we are invited to fill in, I invite all the members of Alert to actively participate to the **GA**. This will allow us to enrich the Association of new and stimulating experiences.

New Alert members

During the last Board of Directors held in Aussois on October the 9th, two European Universities have been accepted as new Alert members: Eidgenössische Technische Hochschule of Zurich (ETH) and Technische Universität Dresden (TUD).

The current number of Alert members is then 22. You can find the updated list of Alert members on <http://alert.epfl.ch>. Under the section "About us/members" you will find a detailed description of most of the research groups, with the names of active researchers and present PhD students. The main research topics are listed and the main contact informations are provided.

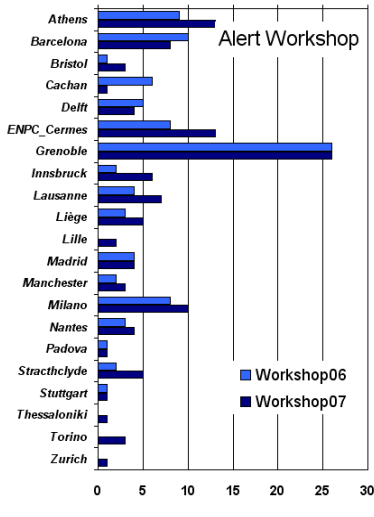
The Zurich research group of ETH (team

responsible: prof. Hans Herrmann) is composed by three researchers, three post-docs and five PhD Students. The main research activities concern fragmentation, discrete elements, critical energy, fibre models, damage, failure, dynamic fracture, Rayleigh waves, Paris law, failure of composites, hybrid methods, FEM, fracture of wood, creep, laminates, quicksand, mechanical behaviour of dense colloids, erosion of soils, flow in porous media, fragmentation, Brazil test, asphalt, space filling packings, roller bearings, conformal



"The logos of new members of ALERT Geomaterials"





Participants to the workshop coming from Alert member Institutions

maps, turbulence, Richardson law. The Dresden research group of TUD (responsible prof. Ivo Herle) is composed by two researchers, one post-doc and two PhD students. The main research fields are laboratory testing of soils, stress-strain behaviour, constitutive modelling of soils, hypoplastic models, numerical problems in geotechnical engineering, analytical solutions

Workshop 2007

The three sessions of Alert Workshop 2007 have been devoted to:

- 1. Geomechanics of structured materials**
coord L. Laloui and V. de Gennaro
- 2. Inverse and stochastic modelling**
coord F. Molenkamp and M. Hicks
- 3. Time-dependent processes in geomechanics**
coord P.Y. Hicher and M. Karstunen

Here on the right the regional distribution of participants coming from institutional

in geomechanics, standards for geotechnical calculations, earth pressure calculations and large scale model tests, numerical simulations in geotechnical and tunnel engineering. Further details on research topics of these two research groups and of all the other Alert members are available on: <http://alert.epfl.ch/history/aboutus.html>.

members of Alert is reported. There have been also 51 participants coming from non Alert member Institutions. The total number of participants was then 172!! The data concerning the past Alert Workshop 2006 are also reported, and we are proud to stress that almost all the members have increased the number of participants. The program was very rich, collecting 22 contributions in session 1, 17 in session 2 and 19 in session 3. Thank you to all the active participants and in particular to the coordinators!

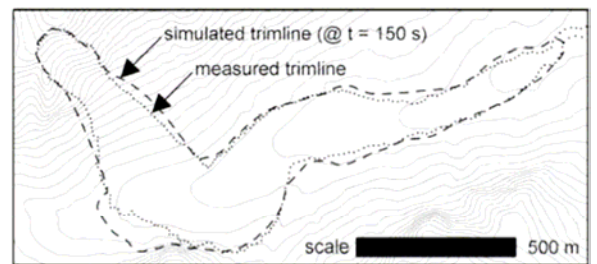


Prof. Kolumban Hutter Academia Sinica (Taiwan)

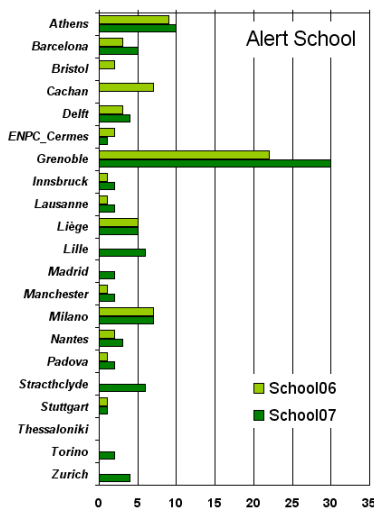
Invited Lecture 2007

It was a great pleasure during the Alert workshop 2007 to host as special invited lecturer **prof. Kolumban Hutter**, who presented a learned dissertation titled "Recent advances in debris flow and landslide modelling". Starting from the analysis of small scale experimental test results, prof. Hutter outlined a theoretical approach capable of reproducing extraordinary well during the evolution of time the landslide run out in a 3D

spatial domain. To remind us the pleasure of having attended the lecture, here below two pictures kindly sent us by prof. Hutter are reported. On the left a picture of the rock slide-debris avalanche in British Columbia (Nomash River, Canada, 1999) is shown, while on the right the observed and computed extension of the deposit are compared. We thank a lot prof. Hutter for his presence in Aussois, its lecture was very appreciated and it stimulated the scientific debate into our community.



Left: rock slide-debris avalanche in British Columbia (1999) Above: Comparison between the observed and computed extension of the deposit

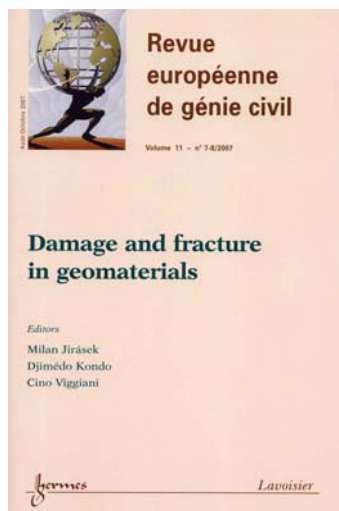


Participants to the workshop coming from Alert member Institutions

ALERT Doctoral School 2007: "Damage and Fracture in Geomaterials"

The Alert Doctoral School 2007 was devoted to "Damage and Fracture in Geomaterials", organised by prof. G.Viggiani (INPG-UJF, Grenoble), prof. M.Jirasek (Czech Technical University) and prof. D.Kondo (Université de Lille). On behalf of the Alert Association, it's our

pleasure to thank the organisers and all the teachers (Ignacio Carol, Frédéric Dufour, Cristian Dascalu, Luc Dormieux, Angelo Simone) for their effort and for the quality of the product. There have been 94 participants coming from Alert members (see the graph on the right);



Revue Européenne de Génie Civil



Dr. David Mašin
Charles University (Prague)
Winner of Alert PhD prize 2007

List of Participant to the 1st Alert Poster Session

1. Numerical modelling of the impact of a rock on a coarse soil (by F. Bourrier, F. Nicot & F. Darve)
2. The Hydromechanical and microscopic properties of a clay in presence of Chromium (by H. Souli & J-M. Fleureau)
3. Influence of nonlinear SSI on the seismic response of reinforced concrete multistory frames (by E. Saez, F. Lopez-Caballero & A. Modaressi-Farahmand Razavi)
4. Calculation of shear band thickness in sensitive soft clays (by V. Thakur)
5. A constitutive model for fibre reinforced sands (by A Diambra, E. Ibraim & A. R. Russell)
6. A 3D Macro element for Soil Structure Interaction (by S. Grange, P. Kotronis & J. Mazars)
7. 7-story building (Benchmark NEES): Numerical modeling and influence of SSI (by S. Grange, P. Kotronis & J. Mazars)

and 32 other participants came from universities not belonging to Alert. The total number of participants was then 126!

The Alert School 2007 was focused on damage and fracture in geomaterials, a topic which is of interest in a large number of important and critical problems: deep geologic disposal of radioactive waste, terrestrial sequestration of carbon dioxide to mitigate adverse effects on the atmosphere, discovery and recovery of hydrocarbons, penetration of earth/concrete structures for military applications, and many others. In all these cases, a critical issue is in fact our ability to understand (and model) how discrete fractures develop, grow, and interact with each other – fractures in geomaterials seldom occur in isolation. It should be added that damaged zones and fractures not only control the overall mechanical behavior, but can also be the principal pathways for fluid/gas flow.

As compared to other engineering materials, concrete-based and geological materials are manifestly heterogeneous and often include preexisting (micro- and macro-) discontinuities. Moreover, geomaterials are (cohesive and) frictional, which implies that their mechanical behaviour strongly depends

on mean stresses. Therefore, the mechanics of fracture and damage in geomaterials is inherently more complex than in other engineering materials. Although the last two or three decades have seen an increasingly wide application of fracture and damage mechanics to geotechnical problems, only a reasonable understanding of the relevant phenomena has been achieved so far and many issues still deserve further research.

Fractures and fracture networks in geomaterials occur at different scales, from a few microns (micro-cracks) up to tens or hundreds of kilometers (geologic faults). In fact, the very first issue to address when modeling the mechanics of fracture/damage in geomaterials is the scale at which one intends to model the relevant phenomena. In this sense, Damage Mechanics and Fracture Mechanics appear as two different modeling approaches – which are not necessarily alternative, i.e., they can be possibly combined. As it is usual, a special issue of the *Revue Européenne de Génie Civil* has been devoted to the lectures of the Alert School 2007 (see here on the left). The slides of the lectures given in Aussois are available on:

<http://alert.epfl.ch/School/School.html>.

ALERT Phd Prize 2007

Last year Alert Geomaterials funded the Alert PhD Prize in order to advertise the scientific results obtained by PhD students. All PhD students coming from Alert Institutions are eligible candidates for the Alert PhD Prize, and are invited to submit their PhD thesis. Further information about the application rules can be found on:

<http://alert.epfl.ch/phdprize/phdprize.html>.

The Jury of the Alert PhD Prize 2007 was composed by Manuel PASTOR (*Universidad Politecnica de Madrid*), Minna KARSTUNEN (*University of Strathclyde*), Kolumban HUTTER (*Academia Sinica, Taiwan*) and Felix DARVE (*Institut National Polytechnique de Grenoble - Alert President*) as duty member.

The prize was awarded to **Dr. David Mašin**, from Charles University in Prague, for its thesis entitled: **"Hypoplastic models for fine-grained soils"**.

David Mašin was born on 24.8.1978 in Mělník, Czech Republic. He graduated in engineering geology in 2001 (Faculty of Science, Charles University, Prague), he degreed in geotechnical engineering in 2003 (City University, London). In 2006 he got the PhD degree in engineering geology at Charles University in Prague. Since 01/2007 he is Senior lecturer at Charles University (Prague).

The main research interest of David Mašin is soil behaviour, development and evaluation of constitutive models and their application for solving boundary value problems in

geotechnical engineering. The research is focused on the behaviour and modelling of fine-grained soils, including "problematic soils" such as structured, double-porosity and unsaturated materials. Constitutive models are developed within both elasto-plastic (kinematic hardening models) and, namely, hypoplastic frameworks. David Mašin has gained his professional experience at leading universities in the field. His research has been based at the University of Innsbruck (collaboration with Prof. D. Kolymbas), Imperial College, London (Dr. M. Coop and Prof. D. Potts), City University, London (MPhil. thesis under the supervision of Dr. S. E. Stallebrass and Prof. J. H. Atkinson), Université Joseph Fourier, Grenoble (Prof. G. Viggiani, Prof. C. Tamagnini, Prof. R. Chambon and Prof. J. Desrues), University of Dresden (Prof. I. Herle), University of Karlsruhe (Prof. G. Gudehus) and University of Sydney (Prof. N. Khalili). This international cooperation resulted in a number of publications in highly recognized international journals.

This PhD thesis was aimed at developing a hypoplastic constitutive model for fine-grained soils to be applicable in geotechnical practice, i.e. it should predict the behaviour of fine-grained soils with reasonable accuracy by requiring only a minimum number of material parameters.

A complete abstract of the thesis and the list of publications of David Mašin can be found on <http://alert.epfl.ch/phdprize/phdprize.html>.



1st Alert Poster Session: a great success!!

This year, with the aim of promoting information exchange and cooperation among researchers, during the Alert Workshop a Poster Session was held. The poster session is open to all scientific works in the field of soil, rock and concrete mechanics coming from Institutions belonging to Alert. The Alert Bureau would like to warmly thank Azad Koliji (EPF Lausanne) who coordinated the Alert Poster Session and selected 21 posters among all the submitted abstracts. Here on the right you can see the list of participants. All the accepted abstracts have also been collected in the Alert Poster Session Booklet distributed at the Workshop registration desk. Discussions were highly facilitated by the exposition of the posters, and, thanks to the

presence of the authors, many questions posed by the participants received proper answers, and debates went profitably into details. The Poster Session already appears as a habit for the Alert people, and it is very stimulating to spend some time before dinner in scientific discussion on the most advanced research topics while drinking cocktails. The next edition of the Alert Poster Session will be coordinated by Suzanne Chandilar (EPF Lausanne; suzanne.chalindar@epfl.ch). The deadline for submission of abstracts is **July 31, 2008**. Abstracts must be submitted using the provided online electronic form. For further details see the Alert website on <http://alert.epfl.ch>.

8. Complex Dynamic Stress Path Response of Leman Sand (by E. Rascol & L. Vulliet)
9. Laboratory modelling of double porosity lumpy clay (by V. Herbstová, J. Boháč & I. Herle)
10. Effect of drying on clays: aggregation and change in residual shear strength (by V. Merchán, J. Vaunat & E. Romero)
11. Identification of model parameters supported by artificial intelligence (by R.F. Obrzud, L. Vulliet & A. Truty)
12. Finite element modelling of thermoelasto-plastic water saturated porous materials (by L. Luisson, B. François, R. Bortolotto, L. Sanavia & L. Laloui)
13. Experimental investigation on the time dependent behaviour of Boom clay (by T. T. Le, Y. J. Cui, P. Delage, X. Li)
14. Dispersion tensor in saturated double porosity medium obtained by double homogenization (by T. D. Tran Ngoc & J. Lewandowska)
15. Impact behavior of cells filled with geomaterials (by S. Lambert, F. Nicot & P. Gotteland)
16. Numerical modeling of the soil moisture change induced by soil atmosphere-vegetation interaction (by S. Hemmati, B. Gatmiri & Y. J. Cui)
17. Flood Embankments Reliability Rating (by M. Redaelli & M. Dyer)
18. New insight into the unified constitutive modelling of unsaturated soils in constrained conditions (by Mathieu Nuth & Lyesse Laloui)
19. Mobilisation of Earth Pressure on supporting Plates of TBM (by M. Kupka, M. Arnold & I. Herle)
20. A simple constitutive model for unsaturated soils with respect to fabric microstructure (by W.T. Solowski, R.S. Crouch & D. Gallipoli)
21. Poromechanical behaviour of hardened cement paste in isotropic stress state (by S. Ghabzloo, J. Sulem, J. S. Guédon)

The soilmodels.info project

The mechanical behaviour of geomaterials is complex and, as a consequence, material models form an important part of any numerical analysis in geotechnical engineering. Currently, there are so many constitutive models available that it is difficult to independently evaluate and compare their capabilities. Moreover, geotechnical engineers generally have neither the time nor the expertise to implement the advanced models into finite element (FE) codes, so their choice remains confined to the few (often simple) models which happen to be already available in commercial FE codes and the use of advanced models remains constrained to academic environment. To advance from this state, we would like to announce that a **new**

open source database of constitutive models for geotechnical engineering has been created, and is now available on www.soilmodels.info. The models are implemented in a standardised format, and can be used by several commercial Finite Element packages, either directly, or through interface implementations. In order to make the project successful, we would like to encourage the developers of constitutive models to contribute to the database and to encourage the users to provide feedback, which can stimulate further developments.

G. Gudehus, A. Amorosi, A. Gens, I. Herle, D. Kolymbas, D. Mašin, D. Muir Wood, R. Nova, A. Niemunis, M. Pastor, C. Tamagnini, G. Viggiani

ALERT Workshop & School 2008

The **ALERT Workshop 2008** will be held in Aussois on October 6th to 8th 2008. The titles of the three sessions are listed here on the right. Please don't forget to submit your abstracts by email directly to the coordinators using the **abstract form** you can find on the Alert Geomaterials site (<http://alert.epfl.ch>). **The deadline for abstract submission is April the 30th 2008.**

The 19th Alert Doctoral School 2008 will be devoted to **Discrete modelling of geomaterials**, and will be organised by prof. Hans Herrmann (ETH Zürich) and prof. Francesco Calvetti (Politecnico di Milano). As usual, the program of the school lasts

three days, from 9th to 11th of October. On line registration to the workshop and to the school will be opened in May 2008 on the Alert website, and it will be advised in the next issue of the newsletter and through the Alert mailing list. Please don't forget to fill in your on line registration form with all the requested data (date and time of arrival and departure, email, address and affiliation,...), in order to help us to fulfill your needs!! Further details on inscription and accommodation as well as the detailed program of both the workshop and the doctoral school will be available on <http://alert.epfl.ch>.

1. Multiphysics of multiphase materials

coord E. Papamichos and L. Sanavia
epapamic@civil.auth.gr
sanavia@dic.unipd.it

2. Field and laboratory testing

coord P. Delage and M. Arroyo
delage@cermes.enpc.fr
marcos.arroyo@upc.edu

3. Localisation in Geomaterials

coord J. Desrues and A. Zervos
Jacques.Desrues@hmg.inpg.fr
a.zervos@soton.ac.uk

Invited Lecturer 2008

We are proud to announce that the Alert Invited Lecturer 2008 will be **prof. Peter Cundall**. Prof. Cundall has accepted our invitation and will be hosted in Aussois next October. He will also be a member of the Alert

2008 PhD Prize Jury. In the next issue of the Alert newsletter the research activity of prof. Cundall will be outlined, and the title of its lecture announced.

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alertdirector@stru.polimi.it