ALERT Geomaterials

NEWSLETTER - May 2007
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http://alert.epfl.ch

Summary:

EDITORIAL

On behalf of Alert Geomaterials Bureau, constituted by prof. F.Darve (president), prof. L. Laloui (general secretary), Dr. B.Chareyre (treasurer) and myself (director), I have the pleasure to present the first issue of the Alert Newsletter, that is intended to advertise Alert Actions in the field of scientific knowledge dissemination. This issue is devoted to describe Alert activities to the researchers working in Geomechanics that in Europe and outside Europe have not yet joined us. It is our intention to prepare two issues every year concerning the past and the next future activities of the Association. We will try to collect useful news about Alert members in order to know each other better. To this aim I invite you all, Alert members, to send me anything you might judge of interest.

Prof. Claudio di Prisco

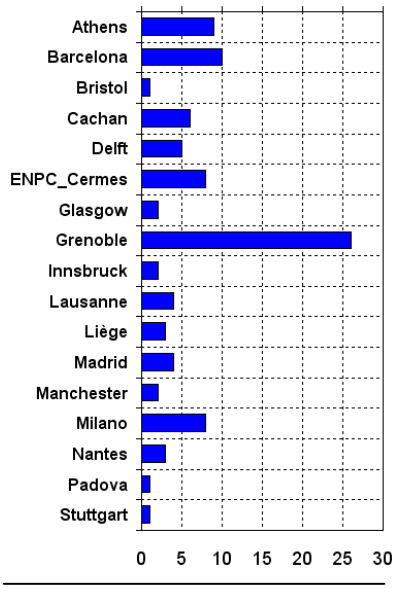
The Association

The **Alliance of Laboratories in Europe for Research and Technology (ALERT)** "Geomaterials" has been created in 1989 by Roberto Nova, Manuel Pastor, Ian Smith, Peter Vermeer, Olek Zienkiewicz and Félix Darve as a pioneering (at that time!) effort to develop a European School of Thinking in the field of Mechanics of Geomaterials. The generic name "Geomaterials" is viewed as gathering together materials, whose mechanical behaviour depends on the pressure level, which can be dilatant under shearing and which are multiphase because of their porous structure. So, the "geomaterials" label brings together mainly concrete, soils and rocks. Its main areas of interest are micromechanics and constitutive modelling of geomaterials, failure, strain localisation and instabilities, large scale computations for geomaterials and geostructures, integrity of geostructures and inverse analysis in geomechanics, environmental geomechanics and durability of geomaterials. According to the Alert Statute the Association is aimed at:

- gathering and enhancing the potential for European scientific and technological excellence in the fields of formation of pre and post-doctoral engineers and researchers, fundamental and applied research, geomechanics and durability of geomaterials;
- improving and developing exchanges among industrialised countries;
- improving and developing scientific and technological cooperation with emerging economies;
- organising workshops and schools;
- giving its patronage to scientific and technological events.

Membership in ALERT & ALERT Statute

Since the very beginning it appeared obvious that there was a crucial need for a joint Graduate School in order to build firmly this European scientific group in the Mechanics of Geomaterials, in close link with students.
For this reason each year, in October, in Aussois, a small village in the heart of French Alps, during the same week of the ALERT Workshop, the ALERT Graduate School is organised. Nowadays there are 21 Alert Institutional Members coming from 10 European countries. Here below the symbols of the 21 institutional members are collected. Each institution is represented within the Alert association by one responsible of the team. The activities of Alert are organised by the Bureau elected every three years by the Alert Board of Directors.
According to the Alert Statute (article 3.2):
"To become a Member, the agreement of at least 2/3 of the Directors present at a meeting of the Board of Directors and the absolute majority of the Board is required, together with the payment of the Association fees. The decision of the Board is made on the basis of a dossier presented by the candidate. Only candidates invited by the Board are permitted to provide such a dossier".
For further information about the organisation of our Association please visit our website:
http://alert.epfl.ch/



Participants to the workshop coming from Alert member Institutions

Workshop 2006

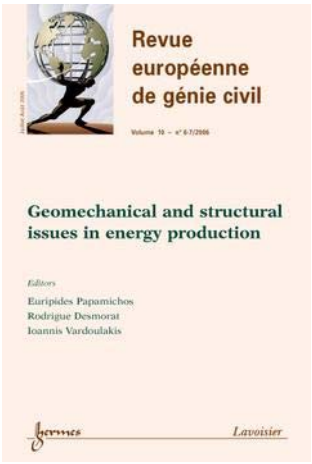
The three sessions of Alert Workshop 2006 have been devoted to:

1.Multi-scale Approaches to Geomaterials
coordinators
B. Cambou (*Bernard.Cambou@ec-lyon.fr*)
and C. Dascalu (*cristian.dascalu@hmg.inpg.fr*)

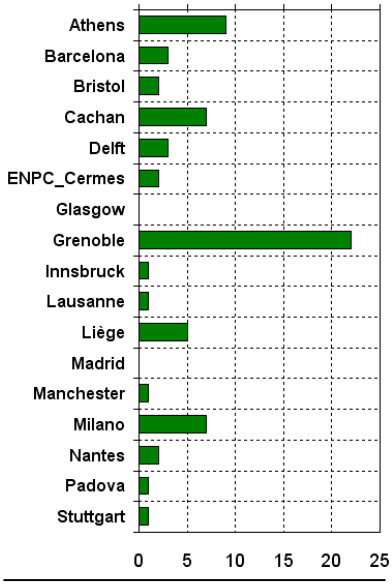
2.Soil-Structure Interaction
coordinators
L. Vulliet (*laurent.vulliet@epfl.ch*)
and C. Tamagnini (*tamag@unipg.it*)

3.Advanced Computational Geomechanics
coordinators
M. Pastor (*Manuel.Pastor@cedex.es*)
and M. Hicks (*Hicksma@fs1.eng.man.ac.uk*)

Here on the left the regional distribution of participants coming from institutional members of Alert is reported. 36 non-Alert members and 3 researchers coming from industries participated too. The total number of participants was then 134!!
The program was very rich, collecting 18 contributions in session 1, 14 in session 2 and 22 in session 3. Thank you to all the active participants and very special thanks to the coordinators! As announced, selected papers from session 1 will be included in a special issue of **Acta Geotechnica**. This special issue is curently under review, and it will be published on December 2007. A selection of papers from session 2 will be published instead in a speial issue of the **Italian Geotechnical Journal** (RIG).
In the next issue of this newsletter we hope to communicate titles and authors of all the selected papers.



Revue Européenne de Génie Civil



Participants to the school coming from Alert members Institutions

ALERT Doctoral School 2006: "Geomechanical and structural issues in energy production"

The Alert Doctoral School 2006 was devoted to "**Geomechanical and structural issues in energy production**", organised by prof. E.Papamichos (University of Thessaloniki - *epapamic@civil.auth.gr*), prof. I.Vardoulakis (National Technical University of Athens - *I.Vardoulakis@mechan.ntua.gr*) and prof. R.Desmorat (Ecole Normale Supérieure de Cachan - *desmorat@lmt.ens-cachan.fr*).
On behalf of the Alert Association it's our plasure to thank the organisers and all the teachers (Tron Kristiansen, Robert Charlier, Erling Fjær, Giuseppe Gambolati, Vincent Maury, Panos Papanastasiou, Frederic Ragueneau) for their effort and for the success of this action.
There were 67 participants coming from Alert members (see the graph on the left); and other 19 participants came from universities not belongig to Alert. 8 participants came from non academic institutions and industries. The total number of participants was then 94!
The 2006 ALERT Graduate School mainly focused on petroleum related geomechanics but addressed the attention also to damage and fatigue of materials and failure of concrete. Over the years, petroleum geomechanics has developed considerably and stands now as an important discipline in the petroleum industry serving many different groups, from exploration and seismics to production and completion, to reservoir management and CO_2 sequestration. All the petroleum companies have realised the additional benefits that geomechanics provide for their operations: the increased petroleum recovery and the improved production rates, the reduced capital and operational costs and the positive impact on the environment. The problems in petroleum geomechanics are usually multi-coupled because they involve not only solids but also one or more fluid phases, chemical processes, erosion and particle transportation. Moreover, in this field, the end users operate at many scales, from the near wellbore scale to the extended reservoir scale.
A special issue of the Revue Européene de Génie Civil was devoted to the Alert Doctoral School (see the figure here on the left); the topics that are addressed in Chapters 1 to 7 cover some of the main geomechanical problems in hydrocarbon production, but the list is of course not exhaustive. Chapter 1 gives an introduction to the geomechanical problems in energy production and provides a larger picture of the particular problems that follow. Chapter 2 develops the subject of poromechanics which is considered a prerequisite theoretical background for later topics. Chapters 3 to 7 address particular problems. In Chapter 3 and 4 large scale problems are considered, like geomechanics and geophysics for reservoir management, reservoir compaction and land subsidence. In Chapter 5 near wellbore region and in particular stability of drilled boreholes are taken into consideration. When wells are put into production, the formation around them may fail and the problem of sand or more generally solids production which is addressed in Chapter 6 arises. To enhance the production the technique of hydraulic fracturing is employed and this is illustrated in Chapter 7. Chapters 8 and 9 address structural topics such as damage and fatigue of materials and failure of concrete structures.

Invited Lecture and Phd Prize in 2006

Prof. Malcom Bolton
University of Cambridge-UK

It was a great pleasure during the Alert workshop 2006 to host as special invited lecturer **prof. Malcolm Bolton** (*mdb@eng.cam.ac.uk*). Prof. Bolton graduated from Cambridge University in 1967, and he joined Andrew Schofield at UMIST in 1969, helping to set up the UK's first purpose-built geotechnical centrifuge, and continuing as lecturer in soil mechanics 1970-79. He returned to Cambridge in 1980 and he is currently Director of the Schofield Centre and Professor of Soil Mechanics.
His lecture was entitled: **Soil deterioration: manifestation, prediction and prevention**. Prof. Bolton was a member of the Jury of the first Alert PhD prize 2006. The prize was assigned to **Dr. Fernando Alonso-Marroquín** (*fernando@essecc.uq.edu.au*) for its thesis on **Micromechanical Investigation of Soil Deformation: Incremental Response and Granular Ratcheting**. Dr. Marroquín was born in Bogota (Colombia) in 1972 and he is currently employed as computational scientist at the Earth System Science Computational Centre (University of Queensland, Australia).

Dr. Fernando Alonso-Marroquín
University of Queensland, Australia.
Winner of Alert PhD prize 2006.

How to apply for the ALERT Phd Prize 2007?

Alert Geomaterials funds the Alert PhD Prize in order to disseminate scientific results obtained by PhD students. The amount of the prize is 1000 €. To be awarded a PhD thesis, discussed during the preceding calendar year (i.e. in the period January 1st to December 31st, 2006) must be judged original and scientifically stimulating. Only PhD students coming from one of the institutions belonging to ALERT are eligible candidates for the prize.
This year the Jury of the prize will be 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* and Alert President) as duty member. The applications must be sent by each candidate to the director of Alert **before June the 30th**.
Each dossier must collect:
- CV of the candidate (in English)
- Abstract of the thesis (5 pages, in English)
- The two most representative papers deriving from the thesis work (in English)
- Full text of the thesis (original language).

All documents must be burnt on a CD-ROM in pdf version; the dossiers have to be sent to

Prof. Claudio di Prisco
Politecnico di Milano
Dipartimento di Ingegnreria Strutturale
Piazza Leonardo da Vinci 32
20133 – Milano (Italy)

New ALERT Members

"The logos of three new members of ALERT Geomaterials"

During the Board of Directors held in Aussois on October 10th, 2006, five different application forms from European Universities have been presented; three of them have been accepted as new Alert members: Politecnico di Torino, Aristotle University of Thessaloniki, Universitè des Sciences and Technologies de Lille. The current number of Alert members is then 21.
You can find the updated list of Alert members on the Alert website 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 **Torino** research group (team responsible: prof. Renato Lancellotta. Email *renato.lancellotta@polito.it*) is composed by 20 researchers. The main fields of research are: wave propagation and site characterization, experimental soil behaviour, laboratory tests, rock fracture mechanics, shear propagation, slope stability, large landslides, hazard and risk analyses, foundation engineering, piles, shallow foundations.
The research group of **Thessaloniki** is composed by 2 Seniors researchers, 2 Post-doc, 3 doctoral Students (team responsible prof. Euripides Papamichos. Email: *epapamic@civil.auth.gr*), and its main research topics are: constitutive and numerical modelling, thermo-poro-elasto-plasticity, damage mechanics, bifurcation and localization phenomena in geomaterials, folding and deformation patterning in geologic formations, borehole and tunnel stability, sand erosion and sand production, reservoir compaction and subsidence, instabilities in thermomechanical processes, fracture and contact mechanics, heterogeneous materials and homogenisation.

The research group of **Lille**, is composed by 6 Seniors, 15 Post-docs and Doctoral Students, 2 Technical Assistants (team responsible prof. Jian-Fu SHAO. Email *jian-fu.shao@polytech-lille.fr*). Its main research activity is devoted to experimental investigation and microscopic

analysis of cement based materials, numerical modelling of anisotropic damage, numerical modelling of THM coupling, micromechanics, damage, fracture, THM coupling, plasticity, damage, chemical-mechanical modelling, experimental investigation of rock materials.
A detailed list of the researchers and of the main topics of interest of the three new members can be found on the Alert website by clicking on *About us / members*.

Poster Session: call for poster proposals

Starting from this year, with the aim of promoting information exchange and cooperation among researchers, all the Alert PhD students are invited to participate to a poster session which will be held during the annual Alert Workshop. **The poster session is open to all scientific topics in the field of soil, rock and concrete mechanics.** Abstracts of the posters will be listed in the Poster Session Booklet of ALERT annual Workshop. The posters of interested presenters will be posted on the ALERT website after the workshop.

Submission of proposals

The deadline for submission of proposals is **July 30, 2007**. The students are requested to prepare an abstract of one page according to the instructions. Proposals should be submitted using the provided online electronic form. For further details see Alert website on

http://alert.epfl.ch/index.htm

Questions about poster session should be directed to the organizer of the 2007 session, Azad KOLIJI (*azad.koliji@epfl.ch*).

Alert mailing list

Though its wide mailing list (more than 630 members) Alert acts also an important way of **promoting opportunities and academic positions for students and young researchers**, as well as of diffusing news and key dates concerning several international events across Europe, and even a litte bit wider…
During the year 2006, for example more than 60 e-mails have been forwarded to the whole mailing list. To subscribe our mailing list, please send an email to :

alertdirector@stru.polimi.it

ALERT Workshop & School 2007

The **ALERT Workshop 2007** in Aussois will be held on October 8th to 10th 2007. The titles of the three sessions are listed here on the rigth. Please don't forget to submit your abstract 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 May the 30th 2007.**

The 19th Alert Doctoral School 2007 will be devoted to **Damage and fracture in geomaterials**, and will be organised by prof. Cino Viggiani (INP Grenoble), prof. Djimedo Kondo (Université de Lille) and prof. Milan Jirasek (Czech Technical University).
As usual, the school lasts three days, from 11th to 13th of october. After a brief overview of the problem and some introductory basic concepts, the School will concern: linear elastic fracture mechanics, non-linear fracture mechanics, mesostructural fracture models, microfracture and damage mechanics, micromechanics of poroelastic damage propagation, energy approaches to fracture and damage, mathematical analysis of strain localization, nonlocal damage mechanics, explicit and implicit gradient damage models, embedded crack models, discontinuous enrichment in finite elements with a partition of unity (xfem, gfem, pufem), continuous-discontinuous modelling of failure.
The detailed program of the doctoral school is available on http://alert.epfl.ch.

Registration to the workshop and to the school will be opened in a few weeks on the alert website, and it will be advertised 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 or arrival and departure, email, address and affiliation,…), in order to help us to fulfill your needs!!

1.Geomechanics of structured materials
coord L. Laloui and V. de Gennaro
lyesse.laloui@epfl.ch
vincenzo.degennaro@enpc.fr

2.Inverse and stochastic modelling
coord F. Molenkamp and M. Hicks
frans.molenkamp@citg.tudelft.nl
michael.a.hicks@manchester.ac.uk

3.Time-dependent processes in geomechanics
coord P.Y. Hicher and M. Karstunen
Pierre-Yves.Hicher@ec-nantes.fr
minna.karstunen@strath.ac.uk

Invited Lecture 2007

During the next Aussois meeting we will have the pleasure to host as Alert invited Lecturer 2007 prof. Kolumban Hutter. Prof. Hutter will present a lecture on **"Recent advances in debris flow and landslide modelling"**. Kolumban Hutter received a diploma in civil engineering in 1964 from ETH Zurich and a M.Sc. & Ph.D. in Theoretical and Applied Mechanics from Cornell University, Ithaca, (New York) in 1973. He held the position of Professor of Mechanics at Darmstadt University of Technology (Germany) from 1987-2006 and is presently a guest scientist at the Laboratory of Hydraulics, Hydrology and Glaciology, at ETH Zürich and at Academia Sinica, (Taiwan). His research interests are in geophysical mechanics with applications in the dynamics of glaciers and ice sheets, the mechanics of granular materials, avalanching flows of snow, debris and mud avalanches, physical limnology and the foundations of continuum mechanics and thermodynamics.
Professor Hutter is author and co-author of more than 360 papers and has written or edited more than 20 books. He has also served as scientific editor of the Journal of Glaciology for 14 years and was the founder and Editor-in-Chief of Continuum Mechanics and Thermodynamics for 17 years. He is also the Founder and Editor-in-Chief of the upcoming book Series "Advances in Geophysical and Environmental Mechanics" published by Springer Verlag. Professor Hutter was awarded the Max-Planck Prize of the Max-Planck Society and the Alexander von Humboldt Foundation (Germany) in 1994, the Alexander von Humboldt Prize of the Foundation of Polish Science in 1998, and the Seligman Crystal of the International Glaciological Society in 2003.

Prof. Kolumban Hutter
Academia Sinica (Taiwan)