



ALERT Geomaterials

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EDITORIAL

Dear Alert member,
This is the fifth issue of our Alert Newsletter. This short and periodic review of our work has become a tool through which our association can leave a trace useful for the future. Below, in order to stimulate a debate within our community on relationships between the ALERT Associations and European Community, you will find some information about European Technology Platforms. Moreover, you will find a report of the 1st

ALERT doctoral course, and the advertisement of a new master school on Environmental Risk Mitigation that will start next academic year in Milan. Please do not hesitate to send us your comments, communications and, in particular, advertisements of new academic/didactic initiatives. Finally, I would like to wish you an enjoyable Summer holiday.
Yours sincerely,

Claudio di Prisco

Can a Technology Platform be envisaged in the ALERT future?

In the last decade, the European policy on funding scientific research has been inspired by the idea of concentrating financial supports on key macro areas of technological interest. In order to individuate these areas, the European Community favoured the creation of Technology Platforms on several strategic fields

(http://cordis.europa.eu/technology-platforms/home_en.html).

At present the scientific field of geomechanics has not yet been framed within any European Technology Platform (ETP). Since Alert Geomaterials has in recent decades become a unique example in Europe of a scientific community oriented towards geomechanics, a path to create an ETP in which our association could play a key role could be conceived. For this reason, in order to open a fruitful discussion on this perspective within our community, below a brief description of ETPs is given. During the next General Assembly we will discuss the actual feasibility of this initiative.

Claudio di Prisco

What is a European Technology Platform?

A European Technology Platform (ETP) is a European network bringing together researchers, industry and other relevant stakeholders in a particular technological field in order to foster European research and development in the concerned area. The emergence of technology platforms represents an important development in addressing some of the major economic, technological or societal challenges with which Europe is faced.

The development of ETPs is due to the pressing need to define RTD (research and technological development) priorities, timeframes and budgets on a number of strategically important issues with high societal relevance for achieving Europe's future growth, competitiveness and sustainable development objectives.

What are the goals of an ETP?

European Technology Platforms are entities aimed at defining research and development priorities, timeframes and action plans on different strategically important issues. The European Commission services are encouraging this process and are closely co-ordinating their activities in this area, as well as monitoring developments and using, where appropriate, the work of the technology platforms when developing research policy. Such networks provide a framework for stakeholders, led by industry, to define research and development priorities, timeframes and action plans on a number of strategically important issues. They play a key role in ensuring an adequate focus of research funding on areas with a high degree of industrial relevance, encouraging effective public-private partnerships to be powerful actors in the development of European research policy, in particular in orienting the Seventh Research Framework Programme to better meet the needs of industry. This is done by means of a Strategic Research Agenda which sets out RTD priorities for the medium- to long-term, including measures for enhancing networking and clustering of the RTD capacity in Europe. This will, of course, need to take close account of the technological framework and the business environment for future market penetration.

Who are the actors involved in an ETP? Possible Stakeholders and Platform Structure:

Due to their demand-driven nature, the key industrial concerns with technological competence in the particular field must play a leading and highly visible role in initiating each platform and moving it forward throughout its life-span. Nevertheless, to be effective, platforms need to mobilise and balance, in an open and transparent way, the efforts of all the other key stakeholders. Within each platform, the following stakeholders are typically involved: Industry (large, medium and small); public authorities



The Network of the 24 Universities ALERT members

(in their role as policy makers and funding agencies, as well as promoters and consumers of technologies); research institutes and the academic community (especially encouraging the academic/industrial interface); the financial community (private banks (including the EIB), the European Investment Fund (EIF), the European Bank for Reconstruction and Development (EBRD), venture capital, business incubators, etc.); and civil society, including users and consumers.

Given their scale, complexity and global reach, technology platforms should not close their doors to the potential benefits of building alliances with third countries. International co-operation should be considered on a case-by-case basis, taking into account the political motivation, the need for reciprocity and the potential for real added value.

Flexibility is also the watch word in respect of the appropriate supporting structure for a given platform. The structure should ensure a good balance between the interests of all the stakeholders involved, at the same time avoiding bureaucracy. A networked approach should be followed, including mechanisms to facilitate the activities of existing networks and the creation of new ones.

The door should be kept open for new initiatives and entities to enter or leave the platform and, as it moves forward from the vision and strategy stage to the implementation phase, its character and structure may also need to change.

What are the main steps to build up a ETP?

There are three basic steps to create a new technological platform. In the first phase, stakeholders of a specific area, led by industry, come together to agree on a common vision. The second phase is the defining of a Strategic Research Agenda, setting out the medium- to long-term objectives for the technology. In a third phase, stakeholders implement the Strategic Research Agenda with the mobilisation of significant financial and human resources.

First Phase:

The first stage in launching a technology platform is to bring all the key stakeholders together. Whilst industry must play a leading and initiating role, the drive of the Commission has often proven instrumental, especially in the start-up phase. In this

context, and in advance of setting up a platform, the main actors have usually been brought together by the Commission services (for example through the organisation of a major conference) in order to develop a 'Vision Document' for the development in Europe of the technologies concerned.

Soon after consensus has been reached amongst all stakeholders on the way forward and on the suitable structure for the platform, a launch event for the platform is often held, thus signalling the formal start-up of the platform's operations. Whilst the Commission's services are providing various measures to support platforms, it is important to note that the Commission is not in any way bound by the views, results or recommendations arising from the activities of any of the technology platforms. Equally, it should be made clear that the setting up of a technology platform in a given field is by no means a pre-condition for inclusion of support for that field within the FP VII.

Second Phase:

Upon start-up, the key activities of technology platforms centre on producing the following deliverables:

- Elaborating a Strategic Research Agenda;
- Discussing mechanisms to mobilise the private and public investments required for the implementation of the research and development strategies;
- Identifying challenges and actions related to education and training opportunities with a view to maintaining and enhancing a highly skilled work force which can ensure the effective future implementation of the technologies concerned in the medium- to long-term.
- Establishment of an ongoing communication process, with a view to raising public awareness and enhancing dialogue on the justification for concentration of efforts at a European level in the technological field concerned.

Third Phase:

The final stage is the actual implementation of the Strategic Research Agenda put together by the ETP. The Strategic Research Agenda is considered by the Commission as a key document to orient community funding within the considered technological field. This is done through the Work Programmes.

First Olek Zienkiewicz Course 2009

The first ALERT local doctorate course took place in Madrid from June 22nd to 26th. The event was dedicated to the memory of Prof. Olek Zienkiewicz, one of the founders of the ALERT Association. Without a doubt it was an excellent first experience.

The school was hosted by the Escuela de Ingenieros de Caminos, Canales y Puertos of the Universidad Politecnica de Madrid (UPM)

and was organized by Prof. Manuel Pastor (CEDEX/UPM) and Prof. Claudio Tamagnini (Università di Perugia). The course was attended by 23 students coming from both ALERT and external institutions.

The main goal of the course was to provide PhD students with a sound knowledge of computational geomechanics. The course included both basic and advanced topics on



Course flyer



the Finite Element Method. The main topics concerned some of the most relevant computational geomechanics issues, i.e. stationary and transient problems, coupled formulations for saturated and unsaturated media, and an overview on constitutive modelling and computational plasticity. The practical examples were focused on offshore engineering, chemical degradation of mines and landslide modelling. Theoretical sessions were joined with examples of applications in engineering problems.

A peculiarity of the course consisted of the organisation of computer sessions aimed at involving the students with a direct application of the theoretical lectures.

The lecturers were:

- R. Castellanza (Politecnico di Milano)
- A.H.C. Chan (University of Birmingham)
- C. di Prisco (Politecnico di Milano)
- J.A. Fernandez Merodo (CEDEX/URJC)

- M. Mabssout (Tanger University)
- P. Mira (CEDEX/UPM)
- M. Pastor (CEDEX/UPM)
- G. Pijaudier Cabot (GPC Nantes)
- L. Sanavia (Università di Padova)
- C. Tamagnini (Università di Perugia)

ALERT Geomaterials is grateful to Prof. Pastor for the brilliant direction of the event and to all the young members of the Madrid group (T. Blanc, P. Cuellar, V. Dremptic, H. Li, D. Manzanal and M. Sanchez) for the excellent preparation of the practical lectures, for the management of all the logistical aspects and for their kind assistance.

The outstanding results of this first experience, together with the good response by all the participants, suggest the possibility of a future repetition of this Zienkiewicz Course on Numerical Methods in Geomechanics.

Invited Lecturer 2009: Dr Suzanne Lacasse



Dr. Suzanne Lacasse
NGI (Norway)

Dr. Lacasse obtained her PhD in 1976. She was Lecturer at Ecole Polytechnique de Montréal (1973-1975), and at MIT (1975-1982). She was also Head of the Geotechnical Laboratory at MIT. Dr. Lacasse became a permanent employee of the Norwegian Geotechnical Institute (NGI) in 1980, where she combined her position at NGI with a visiting lectureship at MIT. She became NGI's Managing Director in 1991 after 10 years as a Senior Engineer for NGI. She holds a number of positions on the boards of private companies and research organisations in Norway and abroad.

As was done for the last ALERT invited lecture, even this year the movie of the presentation will be available on our website.

anisotropy and de-structuring under load, as occurs for quick clays. The model was implemented in finite element analysis program and the verifications are presented.

The estimation of vulnerability to landslides is complex due to its heterogeneity and the measurement and model limitations of the relevant parameters. The lecture presents a quantitative estimation of the physical vulnerability in a probabilistic perspective using Monte Carlo simulation. Guide-lines are provided to transpose qualitative reasoning, prior knowledge and expert judgment into vulnerability factors and models.

Hazard and risk assessment encourages a rational, systematic approach for assessing safety, and a framework to put uncertainties and engineering judgment into a system. In the deterministic approach, stability of a slope is quantified by a safety factor. The engineer tries to deal with the uncertainties by choosing conservative parameters for the deterministic parameters or factor of safety, but does not deal consistently with uncertainties and their effect on safety margin. A probabilistic approach that allows for hazard and risk assessment of slopes provides insight and options for decision-making.

Beyond risk communication and emergency preparedness, strategies for the mitigation of risk can be categorised as (1) structural stabilization measures to reduce frequency and severity, and (2) non-structural measures, such as land-use planning and early warning systems, to reduce the consequences. An optimum risk mitigation strategy involves: (1) identification of triggering scenarios and hazard level; (2) analysis of consequences for each scenario; (3) assessment and selection of measures to reduce or eliminate the hazard or consequences; and (4) communication with authorities and society. The lecture presents a few implementation examples.

Master in Milan on Environmental Risk Mitigation

Politecnico di Milano initiates CERM, a new double didactical programme in civil engineering for environmental risks mitigation.

Starting from Academic Year 2009/10 Lecco Campus will host the International Master and Master of Science in Civil Engineering for environmental risks mitigation.

This new didactic programme on Risk Management will offer both a 1-year course (Application Deadline: 31/07/2009) and a 2-year Master of Science programme.

The objective is to provide knowledge and expertise in the field of structural and non-structural measures for the mitigation of natural and

Hazard and Risk Assessment for Landslides and Tsunamis

Abstract

Reducing the impact of natural hazards is both an economical and a social necessity. Loss statistics show that number of fatalities is much higher in developing countries than in developed countries. The frequency of landslide disasters increases due to more extreme weather than before, increased population and increased vulnerability. Geomechanics science needs to contribute to strategies for the mitigation of the risk associated with landslides and natural hazards in general. The lecture presents four key aspects of such contribution, together with case studies for landslides and tsunamis:

- Improved material model to predict landslides
- Estimation of vulnerability to landslides with models of landslide intensity and susceptibility
- Qualitative hazard and risk assessment of landslide and tsunami occurrence
- Mitigation of hazard and risk

The improved material model includes anisotropic strength, structure and rate effects, and focuses on progressive failure. The model is formulated within the elastoplastic framework and is able to account for



technological hazards. All components of risk management are considered: assessment of hazard, exposure and vulnerability; structural and non structural tools for mitigation; and emergency planning and management. Although the courses are centred on the civil engineering culture, a wide variety of different disciplines are included, comprehending various engineering branches, land use planning, natural science, economy and social sciences. Graduates will be prepared to take responsible positions as risk/safety managers in public institutions and organisations in charge of emergency management and civil protection.

Further information:

[http://www.master-riskmanagement.lecco.polimi.it/](http://www.master-riskmanagement.lecco.polimi.it)

cerm.lecco@polimi.it

infostudent@polimi.it

(for foreign applicants to MSc programme only)



ALERT Worksop 2009
Organizing Institutions

ALERT PhD Prize 2009

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, 2008) must be judged original and scientifically stimulating. Only PhD students from one of the institutions belonging to ALERT are eligible candidates for the prize. This year the Jury of the prize will be

composed of Suzanne LACASSE (*Norwegian Geotechnical Institute*), Ivo HERLE (*University of Dresden*), Gioacchino VIGGIANI (*Université Joseph Fourier de Grenoble*) and Felix DARVE (*Institut National Polytechnique de Grenoble* and Alert President) as duty member.

The winner will be invited to present his research in Aussois and the movie of his presentation will be uploaded on our website .

ALERT Workshop 2009: october 12 to 14 2009

The detailed program will be soon available on the ALERT website

1. Modelling of natural hazards and vulnerability of structures in geomechanics

coord. M. Pastor and P. Kotronis

mpastor@cedex.es

panagiotis.kotronis@hmg.inpg.fr

2. Geomechanics on a small scale

coord D. Muir Wood and P. Delage

muir-wood@bristol.ac.uk

delage@cermes.enpc.fr

3. Erosion in geomaterials

coord. I. Vardoulakis and S. Bonelli

i.vardoulakis@mechan.ntua.gr

bonelli@cemagref.fr

ALERT Doctoral School 2009

The 20th Alert Doctoral School 2009 will be devoted to **failure in multiphase materials**, and will be organised by Prof. Lyesse Laloui (EPFL), Dr. Frédéric Collin (Université de Liège) and Dr. Vincenzo De Gennaro (ENPC). As usual, the school will last three days, from October 15th to 17th, and a detailed program is already available on the ALERT website.

The multiphase behaviour of geomaterials used to be mainly considered from the point of view of the serviceability of the structures, or, in other terms, of deformation analysis. On the other hand, the understanding of the failure mechanisms in geomaterials exposed to thermal, chemical and atmospheric fields with all their multiphysical coupling has reached today a fairly mature stage.

The topics of the school are aimed at providing theoretical, experimental and numerical tools that allow us to deal with a large number of applications like underground structures (storage, civil engineering), surface structures (earth and concrete dams, embankments), natural sites (slopes, cliffs) as well as the use of the geosphere (petroleum and gas extraction, mines and quarries, both

underground and surface). When dealing with the behaviour of multiphase geomaterials, instances of complexity and interaction are numerous, mainly because of the coexistence of several constituents and phases, their physical and mechanical interactions, their reactivity, and their often non-linear behaviour. Flow involves fluids and transport of chemical species. Exothermic reactions can occur within geomaterials, with an influence on heat transfer phenomena. Geomaterial deformation depends not only on the classically understood effective stress, but also on suction and temperature, as well as on the chemical history of material. Coupled transient analyses are in fact a characteristic feature in this field.

Lecturers:

- R. Charlier (Université de Liège)
- F. Collin (Université de Liège)
- V. De Gennaro (ENPC)
- A. Gens (UPC)
- T. Hueckel (Duke University)
- L. Laloui (EPFL)
- R. Nova (Politecnico di Milano)
- G. Pijaudier-Cabot (GPC Nantes)
- J. Sulem (Université de Paris-Est/CERMES)

Poster Session: Call for Proposals

Also this year, with the aim of promoting information exchange and cooperation among researchers, all the Alert PhD students are invited to participate in 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 the ALERT annual Workshop. The posters of interested presenters will be

posted on the ALERT website after the workshop.

The deadline for submission of proposals is **August 28, 2009**. 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 the Alert website:

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

Questions about poster sessions should be directed to the organizer of the 2009 session, Dr. Marta Rizzi (marta.rizzi@epfl.ch).

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alrtdirector@stru.polimi.it