



ALERT Geomaterials

NEWSLETTER July 2010
N°7 Year 4

<http://alert.epfl.ch>

Summary:

Editorial

page 1

European funding opportunities

page 1

Olek Zienkiewicz Course 2010

page 2

Invited Lecturer 2010: Prof. A.P.S. Selvadurai

page 3

ALERT Workshop 2010

page 3

ALERT Doctoral School 2010: a tribute to Prof. Vardoulakis

page 4

ALERT PhD Prize 2010

page 4

Poster Session: Call for Proposals

page 4

EDITORIAL

Dear ALERT member,

as it is in the ALERT tradition, this summer Newsletter is essentially devoted to the next Autumn ALERT meeting in Aussois and also gives a report on the Oleg Zienkiewicz ALERT Summer School, organised this year by Prof. Lyesse Laloui in Lausanne. The success of the ALERT summer schools was confirmed by the number of participants, markedly higher for this second issue. This year a volume collecting the different contributions of the lecturers was also published. These schools are indeed a great occasion for disseminating a common way of thinking and approaching geotechnical subjects from the perspective of advanced continuum/discontinuum mechanics theories.

All of us must continue to promote this very

useful experience and your help is essential. Please propose new subjects for the event and help by advertising it throughout Europe. Here below, you will find useful information on the large variety of funding opportunities provided by the EU. Please consider the possibility of promoting one or more proposals by involving the as many ALERT members as possible. In particular, please read carefully all the information on COST projects, as they are eminently suitable for thematic networks such as ALERT.

I hope you enjoy reading this Newsletter and wish you an enjoyable summer break.

Yours sincerely,

Claudio di Prisco

European funding opportunities

Last summer the European Commission launched several calls for public funding of research and innovation projects, which may be of interest to those Institutions affiliated to ALERT.

Under the aegis of Framework Programme 7 (FP7), one of the largest funding programmes of the European Union, totalling over 50 billion euros in five years, several opportunities will soon be available.

The richest category of projects funded by FP7 is called *Cooperation*. Cooperation projects are top-down, i.e. a set of detailed topics are pre-defined by the EU commission and projects should cover these objectives. Projects should be proposed by consortia of three to ten partners from universities, research organisations and companies, belonging to at least three different EU countries. A typical small-scale project (STREP) has a budget of approximately 4 million Euros and can obtain funding of approximately 3 million Euros (the co-funding value depends on the typology of the partner and the activities performed within the project), and a large-scale project may get funding up to 10-12 million Euros.

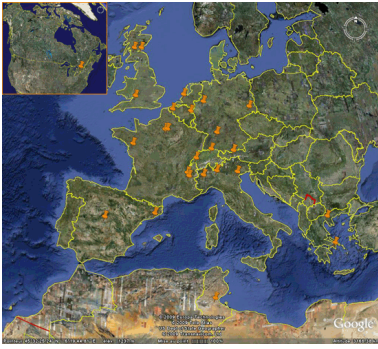
As regards the topics, the Cooperation initiative is structured according to thematic areas, which are described in *work programmes* (i.e. documents describing the topics) and distributed through different *calls*. Thematic areas include *ICT* (with topics on monitoring, ICT for energy-efficient building, ICT for water management, and structural studies on electronics devices), *Transport* (with topics on surface infrastructure design),

Nanomaterial (NMP, with topics on innovative materials), *Health* (with topics on bio-engineering devices and prostheses), and many more.

All these areas have open calls with a deadline for submission between November 2010 and December 2011.

A special initiative recently launched by the EU Commission is the Public Private Partnership (PPP) on Energy-Efficient Buildings. This programme aims at helping the European industrial sector to recover from the economic crisis, and addresses socially important areas such as energy efficiency. The programme is structured in calls, the first one with a deadline of December 2010. Rules and expected funding are the same as those for Cooperation projects.

In addition to these opportunities, there are several bottom-up funding tools, which define specific project execution patterns, but not topics. For example, the Capacities for SME call will fund projects that lead to innovative processes and products for a specific category of European SMEs. For this particular kind of project at least three SMEs from three different European countries are required. These SMEs should have a common need and submit research to a research consortium. The research consortium will issue an invoice, which the SMEs will pay. The cost of the research will be partially reimbursed to the SMEs by the European Commission (the average funding is approximately 1.8-2 million Euros per project). The deadline for submission of Capacities projects is December 2010.



The Network of the 27 Universities which are ALERT members

Another funding tool that can be very useful to research organisations is the COST initiative, which funds travel, workshops, events, and publications within thematic networks (up to 100.000 Euros per project per year, over four

years). NB: the deadline for COST projects' submission is 24 September, 2010. More funding opportunities relevant to ALERT members will be available in the early months of 2011.

Olek Zienkiewicz Course 2010 on Mechanics of Unsaturated Geomaterials

The second ALERT local doctorate course took place in Lausanne from 5 to 9 July. As last year, the event was dedicated to the memory of Prof. Olek Zienkiewicz, one of the founders of the ALERT Association.

The school was hosted by the Ecole Polytechnique Federale de Lausanne (EPFL) and was organised by Prof. Lyesse Laloui. This year the school was attended by 38 students coming from both ALERT and external Institutions. As shown in the figures below, the continuing success of this initiative is confirmed by the increasing number of students.

The course was focused on the large variety of topics related to the mechanics of unsaturated soils. The course included both basic and advanced issues, ranging from experimental results to theoretical developments and numerical applications.

After the presentation of some introductory notions on the physics of unsaturated geomaterials and experimental techniques for

testing unsaturated soils, the course provided a broad description of the most common numerical and constitutive modelling problems concerning the solution of boundary value problems involving unsaturated soils. A variety of practical examples concerning landslides, the construction of embankments and levees, the realisation of underground nuclear waste repository and the desiccation of soils was therefore discussed. Added attractions of the course were a computer session on the calibration of constitutive models and a visit to the geomechanical laboratories of the EPFL.

Thanks to Lyesse for giving our PhD students this very stimulating opportunity and for the brilliant direction of the event and thanks, too, to all the teachers and the young members of the Lausanne group (J. Eichenberger, A. Ferrari, M. Nuth, M. Rizzi) for the excellent preparation of the lectures and for the management of all the logistical aspects.



Course flyer





Invited Lecturer 2010: Prof. A.P.S. Selvadurai



Prof. A.P.S. Selvadurai
McGill University (Canada)

As previously announced, this year in Aussois we will have the great pleasure of hosting Prof. Selvadurai. A.P.S. Selvadurai is professor in the Department of Civil Engineering and Applied Mechanics at the McGill University in Montreal. He obtained his PhD degree in Theoretical Mechanics from the University of Nottingham, UK for research in the area of Non-linear Elasticity and in 1986 the DSc in Theoretical Mechanics for research into Mathematical Modelling of Problems in Geomechanics and Elastomechanics. He was with Carleton University in Ottawa from 1975 until 1993, when he was invited by McGill University to become Chair of the Department of Civil Engineering and Applied Mechanics. He has held Visiting Professorships at the University of Nottingham, Universität Stuttgart, the Laboratoire 3S - Université Joseph Fourier in Grenoble, University of Canterbury (New Zealand), Hong Kong Polytechnic University, University of New South Wales (Sydney), Ecole Polytechnique Fédérale de Lausanne, and Technical University Delft. He has published over 230 research papers in archival journals devoted to applied mechanics, geomechanics and applied mathematics, transport in porous media and computational mechanics. He is the author or co-author of *Elastic Analysis of Soil-Foundation Interaction* (Elsevier, 1979), *Elasticity and Geomechanics, Partial Differential Equations in Mechanics Vols. 1&2* (Springer-Verlag, 2000) and *Plasticity and Geomechanics* (Cambridge University Press, 2002). He serves on the Editorial Boards of nine leading international journals

devoted to *Geomechanics, Applied Mechanics, Computational Mechanics and Engineering Mathematics*. He is a Fellow of the Engineering Institute of Canada, the American Academy of Mechanics, the Canadian Society for Civil Engineering, the Institute for Mathematics and its Applications and the Canadian Academy of Engineering. In 2007 he was elected Fellow of the Royal Society of Canada.

The title of Prof. Selvadurai 's lecture is:
The Analytical Method and its Role in the Development of Geomechanics

Abstract

The development of the subject of geomechanics is deeply rooted in a class of canonical solutions that have been developed for the study of problems in elasticity, plasticity, flow and transport in porous media and the theory of poroelasticity. This lecture discusses examples covering these areas and identifies the significant contributions that the analytical method in geomechanics has made to obtaining results that have practical importance and pedagogic value. In particular, the analytical method provides results that serve as benchmarking tools for calibrating computational methods that are ultimately used for solving more complex practical problems in geomechanics.

As it was done for the previous ALERT invited lectures, even this year the movie of the presentation will also be available on our website.

ALERT Workshop 2010: Preliminary Program

The **ALERT Workshop 2010** will be held in Aussois between 4 and 6 October, 2010. Titles and a brief description of the program for the three sessions are given below.

1. Engineering geostructures

coord. I. Herle and A. Gens
ivo.herle@tu-dresden.de
antonio.gens@upc.edu

Within the context of engineering geostructures several problems will be addressed, such as the analysis of excavation processes and static/dynamic soil-structure interaction, the hydraulic characterisation of soil deposits, and the numerical modelling of multiphysics problems for nuclear waste disposal.

2. Mechanics of clay rocks

coord P. Besuelle and R. Charlier
Pierre.Besuelle@grenoble-inp.fr
Robert.Charlier@ulg.ac.be3

The second day will be devoted to the mechanical behaviour of clays and clayey rocks. Special attention will be paid to problems such as damage, degradation, fracture and anisotropy. The effects on the material mechanical response related to the presence of water phase and temperature changes will also be tackled.

3. Chemo- and bio-mechanical couplings

coord. J.F. Shao and B. Garitte
jian-fu.shao@polytech-lille.fr
benoit.garitte@upc.edu

The last session will deal with geomechanical problems in which a crucial role is played by chemical and biological agents, e.g. in the context of CO₂ injection or recent ground improvement techniques. Given the novelty of such topics, the various contributions will focus especially on theoretical aspects and constitutive modelling strategies.



Organizing Institutions



ALERT Doctoral School 2010

a tribute to Prof. Ioannis Vardoulakis



Prof. Ioannis Vardoulakis

The 21st ALERT Doctoral School 2010 will be devoted, in memory of Prof. Ioannis Vardoulakis, to **Mathematical Modelling in Geomechanics**. It will be organised by Prof. E. Papamichos (University of Thessaloniki) and Prof. J. Sulem (UR Navier-Cermes, Ecole des Ponts ParisTech). As usual, the school will last three days, from 7 to 10 October, and a detailed programme is already available on the ALERT website.

This year's theme covers the areas in which Prof. Vardoulakis made major contributions and the event will be led by his former students and/or close collaborators.

Prof. Vardoulakis is perhaps best known for his work on bifurcation and localisation in geomaterials, an area in which he produced pioneering works in the 1970s and 1980s. He combined constitutive theories and modelling by emphasising the role of micro-structure (Cosserat and second-gradient). He complemented and backed his theoretical work with experimental results throughout the conception of innovative experimental devices and techniques for testing geomaterials. He implemented his theories in computational finite element models with micro-structure for post-failure/post-

localisation studies and discrete element models, where he was particularly interested in the behaviour of granular flows. In the mid-1990s he turned his attention to problems of liquefaction, fluidisation, internal flow and sand production. Applications of his work can be found in petroleum engineering, granular flows and predictions of catastrophic landslide movements and, most recently, multiphase flow and fractional moisture diffusion.

Lecturers

- G. Exadaktylos (*TU of Crete*)
- I.O. Georgopoulos (*NTU of Athens*)
- E. Papamichos (*University of Thessaloniki*)
- P. Papanastasiou (*University of Cyprus*)
- A.P.S. Selvadurai (*McGill University*)
- M. Stavropoulou (*National and Kapodistrian University of Athens*)
- I. Stefanou (*NTU of Athens*)
- J. Sulem (*UR Navier-Cermes, Ecole des Ponts ParisTech*)
- E. Vairaktaris (*NTU of Athens*)
- E. Veveakis (*NTU of Athens*)
- A. Zervos (*University of Southampton*)

ALERT PhD Prize 2010

ALERT Geomaterials funds the ALERT PhD Prize in order to disseminate scientific results obtained by PhD students. The value of the award is 1000 Euros. To be successful, a PhD thesis defended during the preceding calendar year (i.e. 1 January to 31 December, 2009) must be judged original and scientifically stimulating. Only PhD students from one of the institutions belonging to ALERT are eligible to enter.

This year the Jury members will be Pierre-Yves HICHER (*Ecole Centrale de Nantes*), David MUIR WOOD (*Dundee University*), Patrick SELVADURAI (*McGill University*) and Felix DARVE (*Institut National Polytechnique de Grenoble* and ALERT President).

The winner will be invited to present his/her research in Aussois and a film of his/her presentation will be available on our website.

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.

Submission of proposals

The deadline for submission of proposals is **27 August, 2010**. Students are requested to prepare an abstract of one page in accordance with the instructions provided. Proposals should be submitted on the online electronic form provided. For further details see the ALERT website:

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

Questions about the poster session should be directed to the organiser of the 2010 session, Dr Marta Rizzi (marta.rizzi@epfl.ch).

To subscribe to or unsubscribe from our mailing list, please contact:

alertdirector@stru.polimi.it