



ALERT Geomaterials

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<http://alertgeomaterials.eu>

In This Issue . . .

EDITORIAL	1	ALERT Olek Zienkiewicz Course 2021	4
ALERT PhD Prize 2020	2	ALERT Workshop 2021	5
ALERT Special Lecture 2020	2	ALERT Doctoral School 2021	6
ALERT Doctoral e-School 2020	3	ALERT Special Lecture 2021	7

EDITORIAL



ALERT President
Gioacchino (Cino)
Viggiani

Dear ALERT members,

the COVID-19 pandemic is not over yet, and for us all moments of stress alternate with moments of hope. We can expect an improvement in the coming months, but the pandemic has so often overturned all forecasts that, as of today, no certainty is allowed.

Last year, after careful consideration, the Board of Directors decided to cancel our activities in Aussois for the first time, after 26 years! However, we decided to organize remotely the doctoral school for 2020. This first ALERT e-School was a great success with more than 150 participants connected for the 4 half-day lectures. It was a challenge to organize the lessons, to ensure the availability of platforms for distance teaching but the two coordinators Manolo Pastor (Madrid), Wei Wu (Vienna) and their teams perfectly ensured the full success of this doctoral school on "Particle-based continuum numerical methods in Geomechanics". We really thank Manolo and Wei for all their efforts!

In 2020, we organized also the PhD prize with a record of 16 applications. We had the pleasure to attend the presentation by Dr Muraro (Delft University of Technology), followed by our Invited lecturer Chris Spiers from Utrecht University, who accepted to give his lecture on-line.

Due to the situation, we were obliged to postpone both the workshop and the Olek Zienkiewicz Course. Fortunately, the OZ Course entitled "Looking into the rhizosphere: the interface between plant science and soil mechanics" is currently organized remotely by Alessandro Tarantino (University of Strathclyde) and Enrique Romero (UPC). Two-day preparation lectures have been already given on the 13th and 21th April. The course will be held online on 18-20 May 2021.

Concerning the coming ALERT activities, we all wish to

meet again in Aussois in order to share scientific discussions or simply a coffee (or a beer). You bet we will try our best to organize all the activities in Aussois. But, as we all know, the situation can evolve negatively in France, in Europe ... The Bureau will let you know the final decision on the organisation mode by the end of June, but be sure that this year all our activities (including the three workshop sessions) will take place – in the worst case, remotely! The Bureau warmly thanks the organizers of the workshops and of the school for accepting to play the game even in case everything needs to take place remotely.

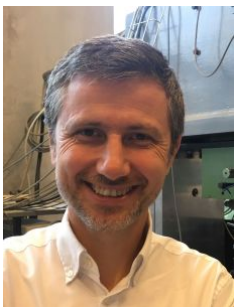
The ALERT workshop has been postponed to this year and the three sessions in 2021 will be those that were originally planned for 2020. This year, the half-day session is devoted to "Machine learning and Geomechanics". The objective of this session is to show how Machine Learning can be used to bypass the current limitations of several experimental and numerical methods in geomechanics and more generally in solid mechanics. This session will certainly lead to some connections with the ALERT Doctoral school dedicated to "Constitutive modelling".

The election of the new Board of Directors for the period 2020-2023 had to be cancelled last year. This year, the election will take place in Aussois or remotely (depending on the situation). All permanent professors, researchers and technicians belonging to an ALERT member Institution are eligible candidates for the Board of Directors.

According to the evolution of the pandemic, further information on the organization of our activities will be given in due time as a post in ALERT-Geomaterials website.

Keep staying safe, long life to ALERT-Geomaterials!

Frédéric Collin and Cino Viggiani



ALERT Director
Frédéric Collin



ALERT PhD Prize 2020



Stefano Muraro (TU Delft)

The jury of the ALERT PhD Prize 2020 was composed of the professors G. Viggiani (President of ALERT), C. Spiers (ALERT Invited Lecturer for 2020), I. Herle (chosen member) and C. Tamagnini (chosen member). Only PhD students from one of the institutions belonging to ALERT are eligible candidates for the prize, which consists of a certificate and a reward of 1000 Euros.

The three finalists, Stefano Muraro (Delft University of Technology), Youssouf Abdalla (Ecole des Ponts - ParisTech) and Philipp Braun (Université Paris-Est) were chosen by the jury out of 16 applications.

The jury finally awarded the PhD student Stefano Muraro for his work entitled

The deviatoric behaviour of peat: A route between past empiricism and future perspectives

The abstract of this PhD thesis is available on the ALERT website. The presentation given by Dr Muraro was recorded and is available for downloading using the following link:

<https://youtu.be/GYVs3jfLn1U>

[Back to Contents](#)



The ALERT Special Lecturer 2020
Prof. C. SPIERS

Special Lecture 2020: Prof. Christopher (Chris) Spiers

The ALERT Special lecture 2020 was delivered by Prof. Christopher Spiers, Professor of Earth Materials and Head of the High Pressure and Temperature Laboratory at Utrecht University.

The title of the lecture was:

Induced seismicity in the giant Groningen gas field, Netherlands: Understanding the underlying rock and fault mechanical controls

The lecture was recorded during the presentation and is available for downloading on the ALERT website or using the following link:

<https://youtu.be/NWZM0Y3N6fE>

[Back to Contents](#)



ALERT Doctoral e-School 2020

Last year, the first ALERT Doctoral e-School 2020 was taught and attended remotely by more than 150 participants. It lasted every morning, from Monday, 28th September to Thursday, 1st October. The topic of the school was

Particle based continuum methods in geomechanics

This school was organized by Manuel Pastor (Universidad Politécnica de Madrid) and Wei Wu (BOKU).

The lectures were presented by

- Ha Bui (Monash University)
- Johan Gaume (EPFL)
- Antonia Larese (Università degli Studi di Padova,)
- Manolo Pastor (Universidad Politécnica de Madrid)
- Steve Sun (Columbia University)
- Wei Wu (BOKU)

The aim of the school was to cover the increasing interest in the geomechanics community to apply the particle-based continuum methods to the problems with free surface flow, large deformation and discontinuous deformation. The last decades saw rapid develop-

ment of numerous particle-based methods in computational mechanics, e.g. SPH (Smooth Particle Hydrodynamics) and MPM (Material Particle Method). Geomechanics with complex material behaviour and problem setting offers an excellent playground for meshfree methods. The lectures in this school offered an overview of some widely used particle-based numerical methods in geomechanics. Both mathematical fundamentals and application examples were provided.

In order to tackle these topics, the four half-days of the school were divided into :

- Introduction to SPH in geomechanics
- Constitutive modelling for fast granular flow
- Applications of SPH models in geomechanics
- Depth integrated models for fast landslides and related phenomena
- MPM and its application to snow
- PFEM and its applications to technical engineering
- LBM-DEM for porous media

On behalf all the ALERT members we want to thank the lecturers and the organizers for their commitment.

[Back to Contents](#)

The accompanying book, containing articles referring to the lectures, as well as some books of previously held doctoral schools can be downloaded from the ALERT website.

<http://alertgeomaterials.eu/publications/>



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Organising Institutions of the
ALERT School 2020



ALERT Olek Zienkiewicz Course 2021

The 12th ALERT Olek Zienkiewicz course 2021 will be held online on 18-20 May 2021. It is organised in five sessions. The course will be preceded by preparatory lectures organised in four sessions over two days, 13 and 20 April 2021.

The course is coordinated by Alessandro Tarantino (University of Strathclyde) and Enrique Romero (Universitat Politècnica de Catalunya).

The topic of the Course was

Looking into the rhizosphere: the interface between plant science and soil mechanics

This Olek Zienkiewicz School is aimed at stimulating synergies between these two disciplines, soil mechanics and plant science. It is mainly designed for researchers having a soil mechanics background. Its main goal is to introduce the fundamentals of plant morphology, anatomy and physiology and the different hydraulic, hydrological, and mechanical interactions of plants with the ground. It is also aimed at demonstrating the role of continuum and discrete soil mechanics in understanding and modelling plant behaviour with a focus on real applications involving ground-vegetation interactions.

Lectures and tutorials will be held by:

- Evelyne Kolb (Sorbonne Université, France)
- Jean-Yves Delenne (French National Institute for Agriculture, Food, and Environment (INRAE), France)
- Jonathan Knappett and A. Glyn Bengough (University of Dundee, Scotland, UK)
- Gerrit Meijer (University of Bath, UK)
- Barbara Switala (Institute of Hydro-Engineering, Polish Academy of Sciences, Gdańsk, Poland)
- Thierry Fourcaud (CIRAD -UMR AMAP,

France)

- Andrea Carminati (ETH Zürich, Switzerland)
- Louise Egerton-Warburton (Chicago Botanic Garden, USA)
- Anthony Leung (Hong Kong University of Science and Technology, Hong Kong, China)
- Katerina Tsiamposi (Imperial College London, UK)
- Tiina Rose and Joel Smethurst (University of Southampton, UK)
- Enrique Romero and Alessandro Fraccica (Universitat Politècnica de Catalunya / CIMNE, Spain)
- Luca Pagano, Marianna Pirone and Gianfranco Urciuoli (Università di Napoli Federico II, Italy)
- Dominika Krzeminska (NIBIO Norwegian Institute of Bioeconomy Research, Norway)
- Federica Cotecchia and Vito Tagarelli (Politecnico di Bari, Italy)
- Slobodan B. Mickovski and Alejandro Gonzalez-Ollauri (Glasgow Caledonian University, Scotland, UK)
- Alessandro Tarantino (University of Strathclyde, Scotland, UK)

They will cover several issues:

- Root-soil mechanical interactions
- Hydrological soil-plant interactions
- Effect of rhizosphere on soil hydraulic properties
- Short research presentations
- Case studies: mock-up tests, artificial slopes, and natural slopes

On behalf all the ALERT members, we want to thank the lecturers and the organizers for their commitment. For more information, please visit the post-school notes and info on the ALERT website.

[Back to Contents](#)



Organising Institutions of the
ALERT OZ Course 2020

Participants to the ALERT OZ
Course 2020



Election of a new Board of Directors

Following the ALERT Statute, this year a new Board of Directors will be elected. The elections will be organized in Aussois, or if we will not meet in Aussois, they will take place by email (further information will be given in due time). Elections include three different phases:

1. Election of the new members of the Board of Directors
2. Election of the new ALERT President by the Board of Directors
3. Appointment of the new members of the Bureau by the ALERT President

The Board of Directors is composed by 15 members, elected during General Assembly, together with the members of the Bureau (President, Direc-

tor, Vice Director for Administration, Vice Director for Economy). A specific Jury composed by three scrutineers will be appointed by the outgoing ALERT President to manage the election procedure. All permanent professors, researchers and technicians belonging to an ALERT member Institution are eligible candidates for the Board of Directors. Candidatures must be sent by email to director@alertgeomaterials.eu before September 15th. The list of candidates will be then advertised on the ALERT website. Each Institution belonging to ALERT has one vote, cast by the named representative. The ballot will contain the list of candidates in alphabetical order. Each voter must thick

no more than fifteen candidates, and the 15 names which receive the largest number of votes are elected. In case of a tie, the youngest candidate is chosen.

The list of ALERT members is available on <http://alertgeomaterials.eu/alertgeomaterials/members/>

During its first meeting, the new Board of Directors elects the new ALERT President, who finally chooses the new members of the Bureau. For any further detail, the complete rules for the election are available on the ALERT website. [Back to Contents](#)



UNIVERSITÀ DEGLI STUDI DI SALERNO



UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH



POLITECNICO MILANO 1863



ALERT Workshop 2020 POSTPONED TO 2021

The ALERT Workshop will be organized in 2021, from Monday, 27th September to Wednesday, 29th September. Depending on COVID-19 evolution, we hope that the workshop will take place at the Centre Paul Langevin in Aussois, France. But if the conditions do not allow, we will organize remotely. In any case, the participants will be able to attend remotely the Workshop.

The focus of the three workshop sessions and the responsible coordinators are listed below:

- 1 **Forecasting landslide displacements**
coord. S. Cuomo, J. Vaunat & N.M. Pinyol
scuomo@unisa.it
- 2 **Machine Learning and Geomechanics**
coord. I. Stefanou & F. Darve

The session will consist of invited talks only.

3 **Bridging the gap between experiments and modelling: from laboratory testing to prediction**

coord. B. Baudet, C. Jommi, & F. Cotecchia

b.baudet@ucl.ac.uk
cristina.jommi@polimi.it
federica.cotecchia@poliba.it

The Monday and Wednesday sessions include invited speakers as well as contributions from the abstract submission process.

[Back to Contents](#)



ALERT Doctoral School 2021

This year, ALERT Doctoral School will be taught and attended face-to-face in Aussois or remotely, from Thursday, 30th September to Saturday, 2nd October.

The topic of the ALERT School will be dedicated to

Constitutive modeling

and will be organized by Claudio Tamagnini (University of Perugia) and David Masin (Charles University in Prague).

Irrespective of fast development of approaches for the analysis and design in geomechanics based on the methods for discontinuum (such as discrete element method), analysis of continua based on mesh or fast developing particle-based meshless methods still represents major means of numerical analysis in geomechanics. At the very core of such an analysis is a constitutive model: mathematical relationship converting the peculiar behaviour of particulate material, governed by the interactions between individual particles, into the behaviour of continua. As such, a properly selected and calibrated constitutive model has a critical effect on the outcomes of geotechnical simulations.

This school aims to introduce the students into the broad field of constitutive modelling of particulate materials with special emphasis on the behaviour of soils: after the introduc-

tion consisting of summary of basic features of soil behaviour, they will be introduced into fundamentals of constitutive modelling, followed by more detailed description of various modelling approaches - from the basic elastic and elasto-plastic models to more advanced frameworks of hardening plasticity, bounding surface plasticity, generalised plasticity and hypoplasticity. The second day will be focused on various specific more-advanced topics, such as simulation of small strain stiffness and cyclic loading, modelling of unsaturated soils, meta-stable structure, breakage, thermal effects, chemical effects and time and rate dependence, including formulation of finite-deformation plasticity and macroelement modelling. The last day is devoted to steps needed for adoption of models in numerical analysis tools, namely to their implementation in finite element codes. Finally, in practical hands-on sessions, students will train calibration using real experimental data themselves, using both manual and automatic freely-available calibration tools.

The Lectures will be held by Cristina Jommi, Ivo Herle, Claudio Tamagnini, David Mašín and Claudio di Prisco.

The online registration for the ALERT School will open in July and will be announced on the website.

[Back to Contents](#)



Università
degli Studi
di Perugia



Organising Institutions of the
ALERT School 2021



Special Lecture 2021: Prof. Ha Bui

The ALERT Special lecture 2021 will be presented by Prof. Ha Bui, Associate Professor and ARC Future Fellow in the Department of Civil Engineering, Monash University.

His primary research interests are in the areas of computational mechanics and material modelling, with particular focuses on bridging scales in modelling failure of geomaterials and related engineering materials. His other interests are in the area of developing novel real-time monitoring and early warning systems for slope failures and landslides.



The ALERT Special Lecturer 2021
Prof. Ha Bui

He will talk about

Predictions of granular failure across scales: from micromechanics to field-scale applications

Failures associated with granular materials are often destructive and can occur in many different forms (e.g. landslides, embankment failure and liquefaction), causing significant damage to infrastructure and human life, resulting in billions of dollars in damage each year around the world. For this reason, it is essential, not only for designs but also for risk mitigations, to develop advanced computational models capable of predicting field-scale failure of granular materials. It is well-known that field-scale failure of granular materials originated from processes at the meso and grain scales by which the granular contact

network evolves through different stages (e.g. diffuse, localised, sliding) under different conditions (e.g. fast/slow loading, with/without pore-pressure). Modelling individual grains is computationally prohibitive due to the large scale difference (micrometre grain vs several metre structures) that requires a huge amount of computational resources, and constitutive models formulated at the intermediate scale (i.e. Representative Volume Element) is usually needed. However, most existing models lack evolving grain-scale details/structures to inform their macro behaviour, making them empirical (i.e. bounded by the sets of experimental data used to calibrate them) and hence limited in predictive capability. A continuum model possessing key mechanisms and sufficient grain-scale detail is essential for simulations and predictions of field scale failure, as too many details make the model inefficient while too few details impair the predictive capability. In this talk, Bui will discuss several challenges associated with the field scale modelling of granular failure and present our recent research efforts in bridging the scales in modelling granular failure. The work his research team has done to develop an advanced computational tool capable of predicting both onset and post-failure of granular materials suitable for field-scale applications while possessing key grain-scale mechanisms. [Back to Contents](#)

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