



ALERT Geomaterials

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EDITORIAL

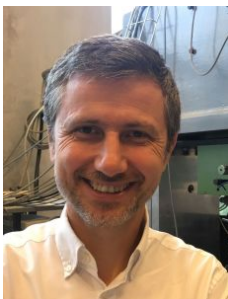
Dear ALERT members,

we think you'll agree with us that it was a real pleasure to meet each other again IN PERSON in Aussois last year. The COVID-19 pandemic was not (and still is not) over, but the Bureau and the Board decided to organize our regular activities in Aussois – with the possibility to attend remotely. The number of participants was fantastic for both the workshop and the school, which is a proof of the vitality of our community. The possibility of attending the event remotely certainly increases the visibility of our activities, and so we have decided to keep this option available also for 2022 – however, only attendance will be possible remotely, i.e., all speakers must be physically in Aussois.



ALERT President
Gioacchino (Cino)
Viggiani

During the 2021 ALERT Workshop in Aussois, the General Assembly elected 15 colleagues who will compose the new Board of Directors for the period October 2022-October 2026. This election was initially foreseen in 2021 but was postponed due to the health situation. The elected members are (in alphabetical order): Frédéric Collin (Liège, Belgium), Claudio di Prisco (Milano, Italy), Anne-Catherine Dieudonné (TU Delft), Jelke Dijkstra (Chalmers), David Mašín (Charles University in Prague), Manuel Pastor (Universidad Politecnica de Madrid), Farangh Radjai (University Montpellier 2), Lorenzo Sanavia (Università di Padova), Ioannis Stefanou (Ecole Centrale de Nantes), Jean Sulem (CERMES, Ecole des Ponts Paris Tech), Claudio Tamagnini (University of Perugia), Alessandro Tarantino (University of Strathclyde), Jean Vaunat (Universitat Politècnica de Catalunya), Gioacchino Viggiani (Université Grenoble Alpes), Antonis Zervos (University of Southampton).



ALERT Director
Frédéric Collin

The very first task of the Board was to appoint a president. Cino Viggiani from Grenoble, France, applied for the position and he was (re)elected. The president

proposed then the composition of the Bureau, knowing that both Andrea Galli and Stéphane Grange had reached the maximum allowed number of mandates. We all thank them for their precious contribution to the organisation of our network. The proposed “bureau” includes a Director, Frédéric Collin from Liège, Belgium ; Claudia Vitone from Bari, Italy, as the vice-director for administration, and Luc Sibille from Grenoble, France, as the vice-director for finances (please note that according to the French law, the vice-director for finances of a French association must be French).

Moreover, Frédéric resigned from his position of elected member of the board, and it was decided to replace him with the first non-elected candidate: Nadia Benahmed (INRAE, France).

Concerning the forthcoming ALERT meeting, we hope that in September 2022 the health situation will allow us for meeting again in Aussois and organizing all our activities in person. This year, the half-day workshop session (on Tuesday morning) is devoted to “Robot ground interaction”. The objective of this session is to explore the interaction of robots and other mechanical devices with the ground at the surface, or introducing most efficient burrowing robots.

The ALERT Doctoral school will deal with “Advanced experimental geomechanics” and is organised by Eddy Andò, Benjy Marks and Ryan Hurley. It should be highlighted that two of the organisers attended the previous ALERT school on this topic (back in 2012) as students: something we should be (and actually are) proud of!

Keep staying safe, long life to ALERT-Geomaterials!

Frédéric Collin and Cino Viggiani



ALERT Workshop 2021

In 2021 the annual ALERT Workshop was held from September 27th to September 29th in Aussois – with the possibility to also attend it remotely. As a consequence, the number of participants significantly increased with respect to the previous years: we had a total of 230 participants, with about one third attending remotely and two thirds in person in Aussois. The regional distribution of the participants from the institutional members of ALERT Geomaterials is shown on the Figure below.

As always since 2013, the session on Tuesday lasted only half a day and was followed in the afternoon by the Board of Directors meeting, the PhD-prize ceremony, and the Special lecture in the afternoon.

The three topics of the 2021 ALERT Workshop are listed below:

- 1 Forecasting landslide displacements**
coord. S. Cuomo, J. Vaunat & N. Pinyol
- 2 Machine learning and Geomechanics**
coord. I. Stefanou & F. Darve
- 3 Bridging the gap between experiments and modelling: from laboratory testing to material models prediction**
coord. B. Baudet, F. Cotecchia & C. Jommi

We thank all active participants and coordinators for their effort.

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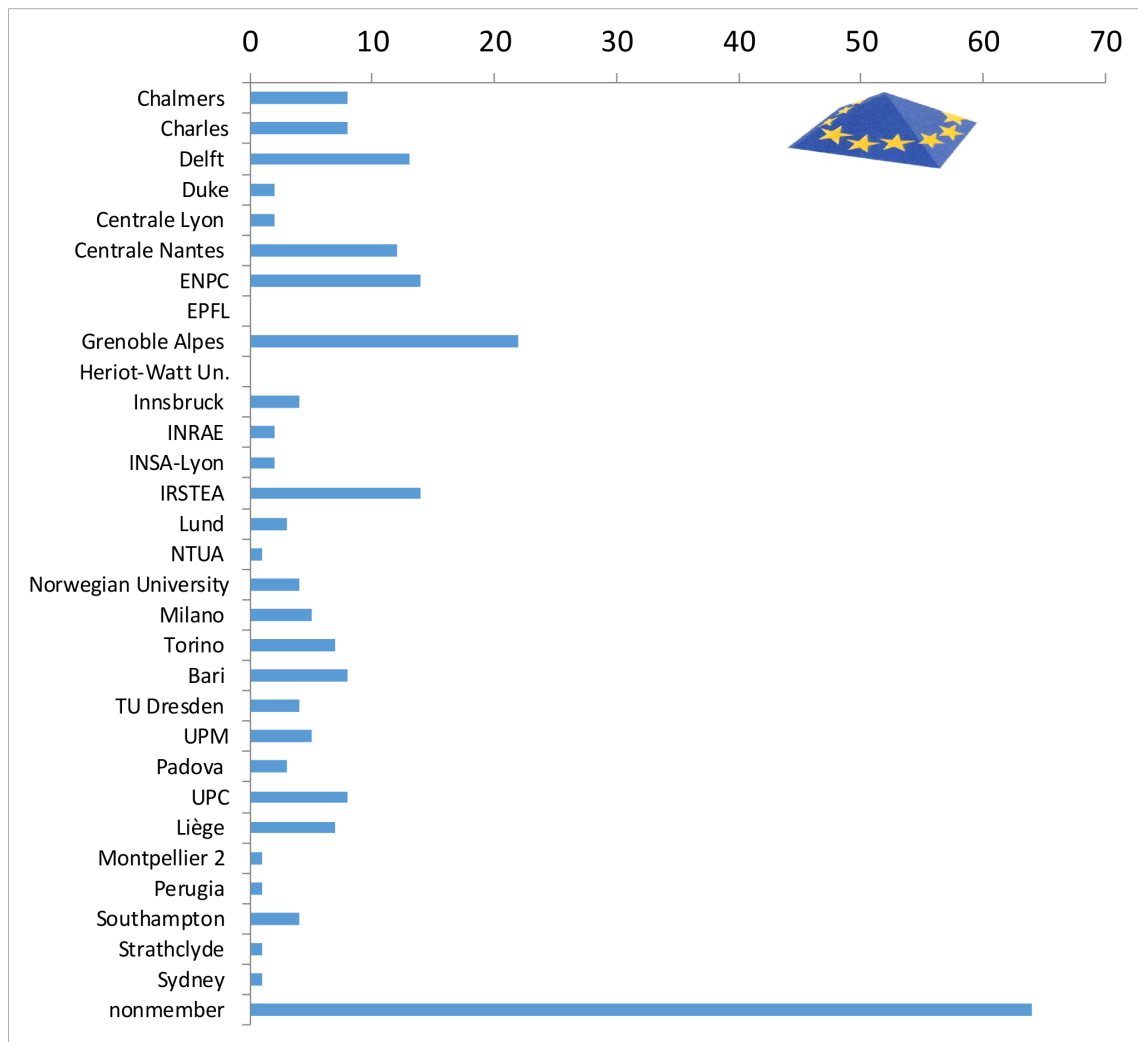


Figure 1. Participants of the ALERT Workshop 2021



ALERT PhD Prize 2021



Cyrille Couture (Université Grenoble Alpes)

The jury of the ALERT PhD Prize 2021 was composed of G. Viggiani (President of ALERT), H. Bui (ALERT Invited Lecturer for 2021), E. Papamichos (chosen member) and F. Nicot (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 four finalists, François Bertrand (Université de Liège), Cyrille Couture (Université Grenoble Alpes), Filippo Masi (Ecole Centrale Nantes) and Panagiotis Triantafyllos (National Technical University of Athens) were selected by the jury out of 8 applications.

The jury finally awarded Dr. Cyrille Couture for his work entitled

Mechanical characterization of porous sandstones in true triaxial conditions: diffuse and localized deformation, effect of anisotropy

The presentation that Cyrille gave in Aussois is available on the ALERT website:

<http://alertgeomaterials.eu/alert-phd-prize-winners//>

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Special Lecture 2021: Prof. Ha Bui



The ALERT Special Lecturer 2021
Prof. Ha Bui

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

The title of the lecture was:

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

An abstract of his presentation is available on the ALERT website:

<http://alertgeomaterials.eu/alert-special-lecture///>

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ALERT Doctoral School 2021

Last year, the ALERT Doctoral School 2021 was taught and attended face-to-face in Aussois or remotely, from Thursday, 30th September to Saturday, 2nd October by more than 200 participants. The topic of the school was

Constitutive modelling in Geomaterials

This school was organized by Claudio Tamagnini (University of Perugia) and David Mašin (Charles University).

The lectures were presented by

- Cristina Jommi (Politecnico di Milano)
- Ivo Herle (Technical University of Dresden)
- Claudio Tamagnini (University of Perugia)
- David Mašin (Charles University)
- Claudio di Prisco (Politecnico di Milano)
- Luca Flessati (Politecnico di Milano)

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 introduction 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.

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

- Basic features of soil behaviour and soil testing
- Fundamentals of constitutive modelling for soils
- The theory of plasticity in constitutive modelling of rate-independent soils
- Hypoplasticity and other incrementally non-linear modelling approaches
- Modelling non-linearity, small-strain stiffness and cyclic loading
- General overview on modelling the coupled behaviour of unsaturated soils
- Meta-stable structure, breakage and thermal effects
- Time and rate dependence
- Finite deformation plasticity
- Numerical implementation of constitutive models
- Macroelement modelling

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

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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/>



Università
degli Studi
di Perugia



Organising Institutions of the
ALERT School 2021



ALERT Workshop 2022

The ALERT Workshop will be organized in 2022, from Monday, September 26th to Wednesday, September 28th. The workshop will take place at the Centre Paul Langevin in Aussois, France. The participants will be able to attend remotely the Workshop. However, this year all the speakers must be in person in Aussois.

The themes of the three workshop sessions and their relevant coordinators are listed below:

1 Mechanics of hard-soils/soft rocks

coord. C. Vitone, N. Benahmed & E. Charalampidou

2 Robot Ground Interaction

coord. R. Fuentes & I. Einav

3 Multi-field approach of gravity-driven disasters in a global climate change context

coord. F. Nicot, F. Magnin, S. Lambert, & F. Calvetti

The three sessions include invited speakers as well as contributions from the abstract submission process.

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ALERT Doctoral School 2022

This year, ALERT Doctoral School will be taught and attended face-to-face in Aussois or remotely, from Thursday, 29th September to Saturday, 1st October.

The topic of the ALERT School will be dedicated to

Advanced experimental geomechanics

and will be organized by Edward Ando (EPFL), Benjy Marks (University of Sydney) and Ryan Hurley (Johns Hopkins Whiting School of Engineering).

The tools which we use to experimentally probe geomaterials have evolved rapidly in the past 20 years. It is now possible to see not only the outside of a sample as it is deformed, but also the internal displacement field. Other tools provide access to the forces and stresses experienced at every point in the sample. We will provide a rationale for the use of these techniques, guidance into their background, development and the state of the art, and

hands-on experience with each tool. Participants will leave this workshop with the methodological, experimental and computational tools required to use these techniques in their own research.

Lectures will be held on two days and a half and will include the following topics, defining what is Advanced Experimental Geomechanics:

- Why even do experiments?
- Measurement Science crash course
- Introduction to 2D imaging from photos to DIC
- Measuring forces with photoelasticity
- Introduction to 3D imaging with RIMS
- Deeper into 3D with X-ray CT
- Towards 4D with deformation quantification

The lectures will be held by Edward Andò, Benjy Marks, Ryan Hurley and Joshua Dijkstra.

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

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EPFL



Organising Institutions of the
ALERT School 2022

ALERT Olek Zienkiewicz Course 2022

This year, no ALERT Olek Zienkiewicz Course has been organized, due to the uncertainties re-

lated to the COVID situation. We hope to have our next OZ Course in 2023.

New Institutional Members of ALERT

UNIVERSITY OF TWENTE.

New institutional Member of
ALERT

In September 2021 there were three applications for ALERT membership: USMB (F. Nicot), University College London (B. Baudet) and University of Twente (V. Magnanimo). The application of Twente was accepted, while the Board agreed on the fact that USMB and UCL have of course a very good application file but they still have to show their implication in the ALERT activities. Their application will be considered again next

year.

University of Twente
represented by prof. V. Magnanimo

With these decisions, the current number of members of ALERT Geomaterials is 37!

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Special Lecture 2022: Prof. Jose Andrade

The ALERT Special lecture 2022 will be presented by Prof. Jose Andrade, George W. Housner Professor of Civil and Mechanical Engineering, Cecil and Sally Drinkward Leadership Chair, California Institute of Technology.



The ALERT Special Lecturer 2022
Prof. José Andrade

José E. Andrade is a civil engineer and the George W. Housner Professor of Civil and Mechanical Engineering at the California Institute of Technology. Andrade is a world leader in developing computer models to simulate the physics of complex systems. He has written hundreds of papers and holds patents on the level set discrete element method (LS-DEM)—a computer modeling tool that can simulate the dynamical response of multi-body systems. Andrade has more than 20 years of experience in the high-tech space with projects ranging from energy to defense to planetary science. His work has been recognized with numerous honors and awards worldwide. In 2022, he was elected a Fellow of The American Society of Mechanical Engineers (ASME).

Andrade got his B.S. in Civil Engineering summa cum laude from the Florida Institute of Technology. He holds a Master of Science and a Ph.D. from Stanford University.

He will talk about

The Force is strong with this one

During his lecture, Prof. Andrade will embrace the concept of force and its fundamental role in complex systems. He will argue that mechanics in general and geomechanics in particular have focused on the concept of stress for the last century but that recent developments make the concept of force timely and relevant. He will focus on the role of force and its evolution in dry and fluid-saturated systems, showing how in the latter systems the concept of effective stress emerges from inter-granular forces. Using the concept of force, he measures for the first time the effective stress proposed by Terzaghi a century ago. In the second part of the lecture, he will use the concept of force to model structural complex systems. He will take multi-block structures (MBS) or topologically interlocked structures as examples. The mechanics of MBS as promising gravity energy storage systems is modeled physically and numerically using the concept of force. He will show the promise of force-based approaches as a general perspective that can tackle a range of relevant problems in complex systems ranging from cell mechanics, to soil mechanics, to gravitational energy storage systems. [Back to Contents](#)

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