



ALERT Geomaterials

Alliance of Laboratories in Europe for Education, Research and Technology

<http://alertgeomaterials.eu>

32th ALERT Workshop and School

Aussois, 27th September to 2nd October 2021

Preliminary Program



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32th ALERT Workshop Program

Aussois, 27th September 2021

SESSION I: Forecasting landslide displacements

Coordinators: Sabatino Cuomo (University of Salerno, Italy), Jean Vaunat (UPC, Spain), Núria M. Pinyol (UPC, Spain)

8:30 – 8:40 Opening of the 32th ALERT Workshop

Cino VIGGIANI (Université Grenoble-Alpes, France), President of ALERT

8:40 – 8:50 Session Opening

Sabatino CUOMO (University of Salerno, Italy), Jean VAUNAT (CIMNE, Spain), Núria M. PINYOL (UPC, Spain)

8:50 – 9:30 Invited Speaker

Interpreting landslide displacements
Leonardo CASCINI (President of LARAM School)

9:30 – 9:50 Taming the curse of dimensionality: forecasting landslide displacements from high spatiotemporal resolution data

Antoinette TORDESILLAS, Guoqi QIAN (University of Melbourne, Australia)

9:50 – 10:10 A Novel Framework for the Integration Virtual Reality Serious Gaming in the Post-failure movements of flow type landslides

Gebray H. ALENE, Shafaq IRSHAD, Vikas THAKUR, Andrew PERKIS, Oddbjørn BRULAND (Norwegian University of Science and Technology, Norway)

10:10 – 10:40 COFFEE BREAK

10:40 – 11:20 Invited Speaker

Modelling landslide dynamics
Manuel PASTOR (Universidad Politécnica de Madrid, Spain)

11:20 – 11:40 Progressive failure or post-failure landslide evolution: how to interpret monitoring data in the light of numerical analyses results

Luca FLESSATI and Claudio di PRISCO (Politecnico di Milano, Italy)

11:40 – 12:00 Monitoring and modeling of a slow-moving landslide in the Pyrenees: the Portalet landslide

Guadalupe BRU, José Antonio FERNANDEZ-MERODO, Juan Carlos GARCÍA LOPEZ-DAVALILLO (IGME-CSIC, Spain)

12:00 – 14:00 LUNCH



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- 14:00 – 14:20** Landslide modelling: how successive local inertial events can result in global microstructure reorganization
Na DENG (Université Grenoble Alpes, INRAE, France), Adriane CLERC (Aix Marseille Univ., INRAE, France), Antoine WAUTIER (Université Grenoble Alpes, INRAE, France), Yannick THIERY (BRGM (French Geological Survey), Zhen-Yu YIN (The Hong Kong Polytechnic University, China), Pierre-Yves HICHER (Ecole Centrale de Nantes, France), Stéphane BONELLI (Aix Marseille Univ., INRAE, France), François NICOT (Université Grenoble Alpes, INRAE, France)
- 14:20 – 14:40** Coupled and uncoupled numerical modelling of the current activity of weather-induced deep and slow landsliding
Vito TAGARELLI, Federica COTECCHIA (Politecnico di Bari, Italy)
- 14:40 – 15:00** Liquefaction-induced flow-landslides. MPM modelling of a real case.
Gaia Di Carluccio (CIMNE, Spain), Nuria M. Pinyol (CIMNE, Universitat Politècnica de Catalunya, Spain)
- 15:00 – 15:20** Multiscale MPMxDEM method for geophysical flows with a cohesive granular microstructure
Olivier OZENDA (Univ Grenoble Alpes, INRAE, France), Guillaume CHAMBON (Univ Grenoble Alpes, INRAE, France), Vincent RICHEFEU (Univ. Grenoble Alpes, France)
- 15:20 – 15:50** **COFFEE BREAK**
- 15:50 – 16:10** Design framework for debris resisting multiple rigid barriers
Charles W. W. NG, Clarence E. CHOI (University of Hong Kong, China)
- 16:10 – 16:30** Calculation of slope stability considering soil behaviour during shearing
Kornelia NITZSCHE, Ivo HERLE (Technische Universität Dresden, Germany)
- 16:30 – 16:50** MPM modelling for forecasting landslide-structure interaction
Angela DI PERNA (University of Salerno, Italy), Sabatino CUOMO (University of Salerno, Italy), Mario MARTINELLI (Deltares, The Netherlands)
- 16:50 – 17:10** Two-phase depth-integrated SPH-FD model: application to debris flows equipped with bottom drainage screen countermeasure
Saeid M. TAYYEBI (Universidad Politécnica de Madrid), Manuel PASTOR (Universidad Politécnica de Madrid), Ashenafi L. YIFRU (Norwegian University of Science and Technology, Norway), Vikas KS THAKUR (Norwegian University of Science and Technology, Norway), Miguel M. STICKLE (Universidad Politécnica de Madrid), Ángel YAGÜE (Universidad Politécnica de Madrid), Diego MANZANAL (Universidad Politécnica de Madrid), Miguel MOLINOS (Universidad Politécnica de Madrid), Pedro NAVAS (Universidad Politécnica de Madrid)



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17:10 – 17:30 Perspectives and Closure

17:30 – 18:00 ALERT General Assembly

18:00 – 20:00 Poster Session (intermediate level) and aperitif

20:00 DINNER



32th ALERT Workshop Program

Aussois, 28th September 2021

SESSION II: Special Session on Machine learning and Geomechanics

Coordinators: Ioannis Stefanou (Ecole Centrale Nantes) & Félix Darve (Université Grenoble Alpes)

- 8:25 – 8:30 Session Opening**
Ioannis STEFANOUE (Ecole Centrale Nantes) & Félix DARVE (Université Grenoble Alpes)
- 8:30 – 9:10 Invited Speaker**
Learning Functional Priors and Posteriors from Data and Physics
G. KARNIADAKIS (Brown)
- 9:10 – 9:35** Bridging physics and deep learning for geophysical dynamics: application to ocean observation
R. FABLET (IMT-Atlantique)
- 9:35 – 10:00 Invited Speaker**
Forward and inverse modeling with uncertainty using deep learning: applications to the shallow water equations
M. FORGHANI & E. DARVE (Stanford)
- 10:00 – 10:40 Invited speaker**
Towards a resilient and robust smart sensing empowering diagnosis and prognosis in large civil infrastructures
F. CHINESTA (PIMM Lab, Arts et Métiers Institute of Technology)
- 10:40 – 11:00 COFFEE BREAK**
- 11:00 – 11:40 Invited Speaker**
The last constitutive model: the rise of machine learning, data-driven and physics-based models
J. E. ANDRADE (Caltech)
- 11:40 – 12:05** A direct data-driven approach to nonlinear solid mechanics
L. STAINIER (Ecole Centrale de Nantes)



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12:05 – 12:30 Physics Informed Deep Learning
S. BONELLI (INRAE)

12:30 – 14:30 LUNCH

15:00 – 17:00 ALERT Board of Directors

17:30 – 18:30 ALERT PhD Prize 2021

18:30 – 19:30 ALERT Special Lecture 2021

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

Professor Ha BUI, Monash University, Australia

20:00 BANQUET



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32th ALERT Workshop Program

Aussois, 29th September 2021

SESSION III: Bridging the gap between experiments and modelling: from laboratory testing to material models prediction

Organizers: Béatrice BAUDET (UCL), Federica COTECCHIA (Politecnico di Bari), Cristina JOMMI (Politecnico di Milano/TU Delft)

8:30 – 8:40 Opening Session

Béatrice BAUDET (UCL, U.K.), Federica COTECCHIA (Politecnico di Bari, Italy), Cristina JOMMI (Politecnico di Milano, Italy/TU Delft, The Netherlands)

8:40 – 9:00 Analysis of the heterogeneous response of a sand in triaxial compression using x-ray computed tomography
Selma SCHMIDT, M. WIEBICKE, Ivo HERLE (Technische Universität Dresden, Germany)

9:00 – 9:20 Studying granular mechanics with a novel neutron-diffraction-based experimental approach
Stefanos ATHANASOPOULOS, Stephen HALL (Lund University, Sweden)

9:20 – 9:40 Exploring the microstructural processes in the background of the macro-response of clays
Simona GUGLIELMI (Politecnico di Bari, Italy), F. COTECCHIA (Politecnico di Bari, Italy), F. CAFARO (Politecnico di Bari, Italy), A. GENS (UPC, Barcelona, Spain)

9:40 – 10:00 Water adsorption in the Callovo-Oxfordian claystone
Pierre DELAGE (Ecole des Ponts ParisTech, France), Hamza MENACEUR (Ménard Soltraitement), Jean TALANDIER (ANDRA, France)

10:00 – 10:30 COFFEE BREAK



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- 10:30 – 10:50** Towards Avatar DEM
Matthew COOP (University College London, U.K.), Fatin ALTUHAFI (University College London, U.K.), Cacin WONG (University College London, U.K.), Béatrice BAUDET (University College London, U.K.), Mathias TOLOMEO (Nottingham University, U.K.), Glenn MCDOWELL (Nottingham University, U.K.)
- 10:50 – 11:10** Capabilities of level set and polyhedral shape descriptions for superellipsoids and Toyoura sand
Jérôme DURIEZ (Aix Marseille Univ., INRAE, France), Tarek MOHAMED (Aix Marseille Univ., INRAE, France), Cédric GALUSINSKI (Université de Toulon, France)
- 11:10 – 11:30** Insights into the impact of carbonate distribution pattern on the mechanical behaviour of bio-cemented sands
Aoxi ZHANG, Anne-Catherine DIEUDONNÉ, Timo HEIMOVAARA (Delft University of Technology, The Netherlands)
- 11:30 – 11:50** A multiscale approach for the characterization of bio-chemo-mechanical processes in contaminated marine sediments
F. SOLLECITO (Politecnico di Bari, Italy), C. VITONE (Politecnico di Bari, Italy), F. COTECCHIA (Politecnico di Bari, Italy), M. PLÖTZE (ETH Zurich, Switzerland), A. M. PUZRIN (ETH Zurich, Switzerland)
- 11:50 – 12:30** **Discussion on experimental evidence of physical processes in soils and their experimental characterisation**
- 12:30 – 14:00** **LUNCH**
- 14:00 – 14:20** Coarse-Grained Molecular Dynamics for clays: development of a 2D electrostatic- consistent potential energy interaction function
Angela CASARELLA (Univ. Grenoble Alpes, CNRS, France), Vincent RICHEFEU (Univ. Grenoble Alpes, CNRS, France), A. TARANTINO (University of Strathclyde, U.K.), A. DI DONNA (Univ. Grenoble Alpes, CNRS, France)
- 14:20 – 14:40** Effects of microscale clay damage characteristics on large scale failure mechanisms of clay-rock using multiscale modelling
Christos MOURLAS, Benoît PARDOEN (University of Lyon, ENTPE, France)
- 14:40 – 15:00** Observing and modelling the volumetric collapse of an unsaturated pyroclastic soil
Mariagiovanna MOSCARIELLO (University of Salerno, Italy), B. CHAREYRE (University Grenoble-Alpes, France), C. YUAN (University Grenoble-Alpes, France), D. MANZANAL (Universidad Politécnica de Madrid, Spain), M. PASTOR (Universidad Politécnica de Madrid, Spain)



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- 15:00 – 15:20** Behaviour and modeling of failure in geomaterials: particle breakage, critical state, and rheology
Diego MANZANAL (Universidad Politécnica de Madrid), Matthew COOP (University College London, U.K.), Béatrice BAUDET (University College London, U.K.), M. PASTOR (Universidad Politécnica de Madrid), M. GARCIA-GARCIA (Universidad Politécnica de Madrid), M. MARTIN (Universidad Politécnica de Madrid), Á. YAGUE (Universidad Politécnica de Madrid), P. NAVAS (Universidad Politécnica de Madrid), M. MOLINO (Universidad Politécnica de Madrid), L. SANAVIA (Università degli studi di Padova, Italy), A. LONGO (Università degli studi di Padova, Italy)
- 15:20 – 15:50 COFFEE BREAK**
- 15:50 – 16:10** The incrementally reversible response as an effective proxy for soil fabric anisotropy characterisation
Angelo AMOROSI (Sapienza Università di Roma, Italy), Fabio ROLLO (Sapienza Università di Roma, Italy), Yannis DAFALIAS (University of California, Davis, US)
- 16:10 – 16:30** Fabric evolution in granular soils: experiments, DEM simulations and theoretical modelling
Chaofa ZHAO, Niels KRUYT (University of Twente, The Netherlands)
- 16:30 – 17:10 Discussion on modelling: modelling micromechanical properties and processes with discrete mechanics and continuum modelling of micromechanical processes with macromechanics**
- 20:00 DINNER**



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32th ALERT Doctoral School

Aussois, 30th September 2021

Constitutive Modelling in Geomaterials

Coordinators:

Prof. Claudio Tamagnini, University of Perugia

Prof. David Mašín, Charles University

DAY 1: BASIC CONCEPTS

8:30 – 8:45 Introduction to the course

Claudio Tamagnini, University of Perugia and David Mašín, Charles University

8:45 – 10 :30 Basic features of soil behaviour and soil testing

Cristina Jommi (Politecnico di Milano)

10:30 – 11:00 COFFEE BREAK

11:00 – 12:30 Fundamentals of constitutive modelling for soils

Ivo Herle (Technical University of Dresden)

12:30 – 14:00 LUNCH

14:00 – 15:30 The theory of plasticity in constitutive modelling of rate-independent soils

Claudio Tamagnini (University of Perugia)

15:30 – 16:00 COFFEE BREAK

16:00 – 17:30 Hypoplasticity and other incrementally non-linear modelling approaches

David Mašín (Charles University)

20:00 DINNER



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32th ALERT Doctoral School

Aussois, 1st October 2021

Constitutive Modelling in Geomaterials

Coordinators:

Prof. Claudio Tamagnini, University of Perugia

Prof. David Mašín, Charles University

DAY 2: SPECIFIC PROBLEMS

8:30 – 10:30 Modelling non-linearity, small-strain stiffness and cyclic loading
David Mašín (Charles University)

10:30 – 11:00 COFFEE BREAK

11:00 – 12:30 General overview on modelling the coupled behaviour of unsaturated soils
Cristina Jommi (Politecnico di Milano)

12:30 – 14:00 LUNCH

14:00 – 15:00 Meta-stable structure, breakage and thermal effects
David Mašín (Charles University)

15:00 – 16:00 Time and rate dependence
Claudio di Prisco (Politecnico di Milano)

16:00 – 16:30 COFFEE BREAK

16:30 – 17:30 Finite deformation plasticity
Claudio Tamagnini (University of Perugia)

20:00 DINNER



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32th ALERT Doctoral School

Aussois, 2nd October 2021

Constitutive Modelling in Geomaterials

Coordinators:

Prof. Claudio Tamagnini, University of Perugia

Prof. David Mašín, Charles University

DAY 3: STEPS TOWARDS APPLICATIONS

8:30 – 9:30 Numerical implementation of constitutive models
Claudio Tamagnini (University of Perugia)

9:30 – 10:30 Macroelement modelling
Claudio di Prisco, Luca Flessati (Politecnico di Milano)

10:30 – 11:00 COFFEE BREAK

11:00 – 12:30 Hands-on calibration session (the use of calibration software)
David Mašín (Charles University), Claudio Tamagnini (University of Perugia)

12:30 – 14:00 LUNCH

NOTES: Intentionally, lectures do not include some relevant topics which were covered in ALERT doctoral schools in the recent past. Most notably, thermodynamics (ALERT Doctoral School 2018, Energetical methods in Geomechanics), particle-based discontinuum models (ALERT Doctoral School 2017, Discrete Element Modeling), bifurcation, strain-localization, stability and controllability (ALERT Doctoral School 2016, Modelling of instabilities and bifurcation in Geomechanics).