



ALERT GEOMATERIALS

The Alliance of Laboratories in Europe for Research and Technology
<http://alertgeomaterials.eu/>

23rd ALERT Workshop and School
Aussois, October the 1st to October the 6th 2012

Final Program



23rd ALERT Workshop Program Aussois, October the 1st 2012

Session I: Micromechanics and critical steady states in geomaterials

Coordinators: Yannis Dafalias (UC Davis), Bruno Chareyre (3SR Grenoble INP)

8:30 - 8:40 Opening of the 23rd ALERT Workshop

M. Pastor (Universidad Politécnica de Madrid, Spain), President of ALERT

8:40 Morning Session Opening

Yannis Dafalias¹, Bruno Chareyre² (¹UC Davis, USA; ²3SR Grenoble, France)

8:40 - 9:05 The Effect of Fibre Reinforcement on the Mechanical Behaviour of Granular Materials

Olufemi Ajayi¹, Jeff Priest¹, Louis Le Pen¹, Antonis Zervos¹ (¹University of Southampton, UK)

9:05 - 9:30 Experimental Micro-Mechanics: Following sand deformation in 3D

Edward Andò¹, Gioacchino Viggiani¹, Stephen Hall², Jacques Desrues¹, Pierre Besuelle¹ (¹3SR Grenoble, France; ²Division of Solid Mechanics, Lund University, Sweden)

9:30 - 9:55 An experimental assessment of displacement fluctuations in a 2D granular material subjected to shear

Vincent Richefeu¹, Gaël Combe¹, Gioacchino Viggiani¹ (¹3SR Grenoble, France)

9:55 - 10:20 Heterogeneity and soil element testing

David Muir Wood (University of Dundee, UK)

10:20 - 10:45 COFFEE BREAK

10:45 - 11:15 Invited Presentation

Stress and microstructure in general 3D deviatoric straining of granular media

Colin Thornton (University of Birmingham, UK)

11:15 - 11:40 Asymptotic behaviour of granular materials investigated using discrete element model

David Mašín (Charles University in Prague, Czech Republic)

11:40 - 12:05 Fabric evolution and geometrical interpretation of the critical state

Farhang Radjai¹, Stéphane Roux² (¹LMGC Université Montpellier 2, France; ²LMT-Cachan, France)

- 12:05 - 12:30** Critical states and stress-dilatancy relations in model granular materials: DEM studies
Emilien Azéma¹, Jean-Noël Roux², Farhang Radjai¹ (¹LMGC Université Montpellier 2, France; ²Laboratoire Navier, Champs-sur-Marne, France)
- 12:30 - 14:30** **LUNCH**
- 14:30 - 15:00** **Invited Presentation**
Some basic questions about critical state in granular materials
Bernard Cambou¹, E. Vincens¹, H. Magoaric¹ (¹LTDS École Centrale Lyon, France)
- 15:00 - 15:25** Coupling breakage and capillary effects in constitutive models for granular soils
Giuseppe Buscarnera¹, Itai Einav² (¹Northwestern University, USA; ²The University of Sydney, Australia)
- 15:25 - 15:50** From solid to granular gases: the steady state for sands
Dalila Vescovi¹, Claudio di Prisco¹, Diego Berzi¹ (¹Politecnico di Milano, Italy)
- 15:50 - 16:15** The effect of granular temperature on the stress measured at the steady state
Eleni Gerolymatou¹, Theodoros Triantafyllidis¹, Claudio di Prisco² (¹Karlsruhe Institut for Technology, Germany; ²Politecnico di Milano, Italy)
- 16:15 - 16:45** **COFFEE BREAK**
- 16:45 - 17:10** A multilaminar Hvorslev surface model with non-local strain regularization
Bert Schädlich¹, Helmut Schweiger¹ (¹Graz University of Technology, Austria)
- 17:10 - 17:35** Steady state of solid-grain interfaces during simulated CPT
Marcos Arroyo¹, Joanna Butlanska¹, Antonio Gens¹, O'Sullivan Catherine² (¹Universitat Politècnica de Catalunya, Spain; ²Imperial College London, UK)
- 17:40 - 18:00** **ALERT General Assembly**
- 18:15 - 19:45** **ALERT Special Lecture 2012**
Geophysical Characterization
Carlos Santamarina
(Department of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, USA)
- 20:00** **DINNER**



23rd ALERT Workshop Program Aussois, October the 2nd 2012

Session II: Geomechanics of underground structures

Coordinators: David Mašín (Charles University Prague), Claudio Tamagnini (Università degli Studi di Perugia)

8:20 - 8:30 Morning Session Opening

David Mašín¹, Claudio Tamagnini² (¹Charles University in Prague, Czech Republic; ²Università degli Studi di Perugia, Italy)

8:30 - 9:00 Invited Presentation

The effect of tunnel advance rate on deformations and stability in tunnelling

G. Anagnostou (ETH Zurich, Switzerland)

9:00 - 9:20 Round Robin numerical Test on Tunnels under seismic loading

E. Bilotta¹, F. Silvestri¹ (¹Università degli Studi di Napoli Federico, Italy)

9:20 - 9:40 Centrifuge and numerical investigation of passive failure and deformation mechanisms due to tunneling in sand

K.S. Wong (Charles University in Prague, Czech Republic)

9:40 - 10:00 Application of a kinematic hardening structured soil model to undrained excavation of a tunnel in London clay

M. Arroyo¹, N.A. Gonzales¹, A. Gens¹, M. Rouainia² (¹UPC Barcelona, Spain; ²University of Newcastle upon Tyne, UK)

10:00 - 10:20 Cavity expansion in cross-anisotropic linear-elastic rock

D. Kolymbas (University of Innsbruck, Austria)

10:20 - 10:50 COFFEE BREAK

10:50 - 11:10 Sequential excavation of an elliptical shaft in a weathered granite

A. Topa¹, J. Vaunat² (¹Universidade do Porto, Oporto, Portugal; ²UPC, Spain)

11:10 - 11:30 Numerical modelling of the anisotropic mechanical behaviour of Opalinus Clay using FEM/DEM

A. Lisjak¹, B.S.A. Tatone¹, G. Grasselli¹, T. Vietor² (¹University of Toronto, Canada; ²NAGRA, Switzerland)

11:30 - 11:50 Impact of Geomechanical Parameters on Stability of Natural Gas Storage Salt Cavern

A. Amin¹, A. Ramezanzadeh², J.S.M. Esmaili², B. Benoit³ (¹Shahrood University of Technology, Iran; ²Faculty of Mining, Petroleum & Geophysics, SUT, Shahrood; Iran; ³Brouard Consulting, Paris, France)

- 11:50 - 12:10** In situ stress measurement for hydro-electric projects using hydrofracturing tests; Two Iranian case studies
B. Pahlavan¹, S.M. Hosseini², A. Ramazanzadeh² (¹Gamanehkav consulting engineers, Tehran, Iran; ²Shahrood University of Technology, Iran)
- 12:10 - 12:30** FE modeling of seismic response of diaphragm walls in sand using advanced constitutive models
C. Tamagnini¹, C. Miriano¹ (¹Università degli Studi di Perugia, Italy)
- 12:30 - 14:30** **LUNCH**
- 14:30 - 15:00** **Invited Presentation**
Numerical modelling of installation effects for diaphragm walls in sand
G. Viggiani (Università di Roma Tor Vergata, Italy)
- 15:00 - 15:20** Anisotropic hydromechanical modelling of HGA field-scale experiment in Opalinus Clay
S. Levasseur¹, F. Collin¹, F. Bertrand², R. Charlier¹ (¹Université de Liège, Belgium; ²Université Libre de Bruxelles, Belgium)
- 15:20 - 15:40** Hydro-Mechanic coupled modelling of an experimental gallery with viscoplastic approach and permeability function of rock degradation
R. Plassart¹, S. Raude² (¹Centre d'Ingénierie Hydraulique (CIH) – EDF, France; ²Laboratoire Environnement Géomécanique et Ouvrages (LaEGO), ENSG, INPL, Vandœuvre-lès-Nancy, France)
- 15:40 - 16:10** **COFFEE BREAK**
- 16:10 - 16:30** A modified RBSM method for simulation of stress effects on flow and transport process in fractured rocks
Yao Chi¹, Wanqing Shen¹, Qinghui Jiang², Jianfu Shao¹ (¹Polytech-Lille, France; ²Wuhan University, China)
- 16:30 - 16:50** Modelling the excavation damaged zone in Callovo-Oxfordian claystone with strain localization
B. Pardoën¹, F. Collin¹, S. Levasseur¹, R. Charlier¹ (¹Université de Liège, Belgium)
- 16:50 - 17:10** Flow Across Interacting Fractures
A.N. Ebrahimi¹, F.K.A. Witte¹, N.A.M. Raújo¹, H.J. Herrmann¹ (¹Computational Physics for Engineering Materials, IfB, ETH Zurich, Switzerland)
- 17:10 - 17:30** Two scale modelling of hydromechanical behaviour of clayey rocks
B. van den Eijnden¹, P. Bésuelle¹, R. Chambon¹ (¹3SR Lab and ANDRA, Grenoble, France)

17:30 – 18:00 BREAK

18:00 – 19:00 ALERT PhD Prize 2012

19:00 – 20:00 Poster Session (intermediate level) and aperitif

19:00 – 20:00 ALERT Board of Directors

20:00 BANQUET



23rd ALERT Workshop Program Aussois, October the 3rd 2012

Session III: Geomechanics for Energy Production

Coordinators: *Lyesse Laloui (EPFL), Helen Lewis (Heriot – Watt University)*

8:20 - 8:30 Morning Session Opening

Lyesse Laloui¹, Helen Lewis² (¹EPFL, Switzerland; ²Heriot – Watt University, UK)

8:30 - 8:50 Analysis and investigation of the hydro-mechanical response of deformable fractures to high pressure fluid injection

Vinci Carlo¹, Jörg Renner², Holger Steeb¹ (¹Institute of Mechanics, Ruhr-University Bochum, Germany; ²Institute of Geology, Mineralogy and Geophysics, Ruhr-University Bochum, Germany)

8:50 - 9:10 Testing shales in Thermo-Hydro-Mechanical conditions

Lyesse Laloui¹, Alessio Ferrari¹, Simon Salager¹ (¹Swiss Federal Institute of Technology, EPFL, Switzerland)

9:10 - 9:30 Thermo-mechanical effects of a rapid depressurization in a gas cavern

Hippolyte Djakeun-Djizanne¹, Pierre Bérest², Benoit Brouard³ (¹LMS - École Polytechnique, France; ²Palaiseau, France; ³Brouard Consulting, Paris, France)

9:30 - 9:50 Numerical study of the influence of pre-existing features on the hydraulic fracturing process using FEM/DEM

Giovanni Grasselli¹, Andrea Lisjak¹, Bryan S.A. Tatone¹, Omid K. Mahabadi¹ (¹Department of Civil Engineering, University of Toronto, Canada)

9:50 - 10:10 Contact mechanics problems arising in energy resources recovery endeavours

A.P.S. Selvadurai (McGill University, Montréal, Canada)

10:10 - 10:40 COFFEE BREAK

10:40 - 11:00 Thermo-Elasto-Plastic consolidation analysis with water phase change

Lorenzo Sanavia¹, Lyesse Laloui², Loris Luison¹ (¹Università degli Studi di Padua, Italy; ²Swiss Federal Institute of Technology, EPFL, Switzerland)

11:00 - 11:20 Simultaneous determination of adsorption isotherms and heats of adsorption by a calorimetric-manometric device. Application to microporous carbon

David Pino¹, Frédéric Plantier¹, David Bessières¹ (¹Université de Pau et des Pays de l'Adour, France)

- 11:20 - 11:40** FEM numerical simulation of compaction band propagation
Giuseppe Dattola¹, Claudio di Prisco¹, Eleni Gerolymatou² (¹Politecnico di Milano, Italy; ²Karlsruhe Institute for Technology, Germany)
- 11:40 - 12:00** Advances for the design of seasonal energy storage in building foundations
Fabrice Duprey¹, Albin Kazangba¹, Lyesse Laloui¹ (¹Swiss Federal Institute of Technology, EPFL, Switzerland)
- 12:00 - 12:20** A physical model for studying the mechanical behaviour of a heat exchanger pile
Neda Yavari¹, Anh Minh Tang¹, Jean-Michel Pereira¹, Ghazi Hassen¹ (¹École des Ponts ParisTech, France)
- 12:20 - 14:00** **LUNCH**
- 14:00 - 14:30** **Invited Presentation**
Issues concerning numerical modelling of geomechanical problems at the borehole and reservoir scale
Euripedes Vargas (*Dept. Civil Engineering, Catholic University, PUC Rio, Brasil*)
- 14:30 - 14:50** Sand production simulation coupling DEM with CFD
Natalia Climent¹, Catherine O'Sullivan², Marcos Arroyo¹, Antonio Gens¹
(¹Universitat Politècnica de Catalunya, Spain; ²Imperial College London, UK)
- 14:50 - 15:10** Reactivation of pre-existing fractures by fluid injection experiments at the laboratory scale
Elli-Maria Charalampidou¹, Andreas Reinicke², Sergei Stanchits³, Georg Dresen¹
(¹GFZ - German Research Centre for Geoscience; ²Shell Netherlands; ³TerraTek, Schlumberger)
- 15:10 - 15:40** Characterizing the state of geomaterials at great depth.
Part I: Estimation of in situ stress from borehole data
Gabriele Della Vecchia¹, Anna Pandolfi¹, Guido Musso², Gaia Capasso³
(¹Politecnico di Milano, Italy; ²Politecnico di Torino, Italy; ³ENI E&P, Italy)
- Characterizing the state of geomaterials at great depth.
Part II: Estimation of the representativeness of laboratory samples by comparison of in situ and laboratory elastic wave velocities
Guido Musso¹, Renato Maria Cosentini¹, Sebastiano Foti¹, Cesare Comina², Gaia Capasso³ (¹Politecnico di Torino, Italy; ²Università degli Studi di Torino, Italy; ³ENI E&P, Italy)
- 15:40 - 16:10** **COFFEE BREAK**
- 16:10 - 16:30** Evaluation of a fault zone in a carbonate hydrocarbon reservoir
Emmanuel Lecomte¹, Caroline Chalak², Helen Lewis¹ (¹Heriot – Watt University, UK; ²3SR Grenoble, France)

16:30 - 16:50 Coupling between adsorption and mechanical stress in fractured microporous geomaterials

D. Nicolas Espinoza¹, Jean-Michel Pereira¹, Matthieu Vandamme¹, Patrick Dangla¹ (¹École des Ponts ParisTech/IFSTTAR/CNRS, France)

16:50 - 17:10 Micro-hydromechanical analysis of sand production problems in small oil perforations

AN. Berntsen¹, E. Papamichos² (¹SINTEF Petroleum Research; ²Aristotle University of Thessaloniki and SINTEF Petroleum Research, Greece)

20:00 DINNER



**23rd ALERT Doctoral School
Aussois, October the 4th 2012**

Advanced experimental techniques in geomechanics

Coordinators:

Cino Viggiani (Laboratoire 3SR / Université Joseph Fourier Grenoble)

Steve Hall (Division of Solid Mechanics, Lund University)

Enrique Romero (UPC Barcelona)

8:45 - 9:00 Introduction: content and structure of the school

Cino Viggiani, Steve Hall, Enrique Romero

9:00 - 10:00 Basics of experimental geomechanics

Cino Viggiani (*Laboratoire 3SR / Université Joseph Fourier Grenoble, France*)

10:00 - 11:00 Some key issues in experimental geomechanics research

Carlos Santamarina (*Georgia Institute of Technology, Atlanta, USA*)

11:00 - 11:25 COFFEE BREAK

11:25 - 12:25 Full-field methods in geomechanics

Cino Viggiani (*Laboratoire 3SR / Université Joseph Fourier Grenoble, France*)

12:30 - 14:30 LUNCH

14:30 - 16:00 X-rays – radiography, tomography, diffraction

Cino Viggiani (*Laboratoire 3SR / Université Joseph Fourier Grenoble, France*)

16:00 - 16:30 COFFEE BREAK

16:30 - 18:30 Full-field displacement/strain measurements and Digital Image Correlation – principles and methods

Steve Hall (*Division of Solid Mechanics, Lund University, Sweden*)

20:00 DINNER



**23rd ALERT Doctoral School
Aussois, October the 5th 2012**

Advanced experimental techniques in geomechanics

Coordinators:

Cino Viggiani (Laboratoire 3SR / Université Joseph Fourier Grenoble)

Steve Hall (Division of Solid Mechanics, Lund University)

Enrique Romero (UPC Barcelona)

8:45 - 9:45 Full-field displacement/strain measurements and Digital Image Correlation – from 2D to 3D

Steve Hall (Division of Solid Mechanics, Lund University, Sweden)

9:45 - 10:45 Image analysis

Steve Hall (Division of Solid Mechanics, Lund University, Sweden)

10:45 - 11:10 COFFEE BREAK

11:10 - 12:25 Waves 1: Elastic and electromagnetic waves

Carlos Santamarina (Georgia Institute of Technology, Atlanta, USA)

12:30 - 14:30 LUNCH

14:30 - 15:45 Waves 2: Elastic waves – measurement

Carlos Santamarina (Georgia Institute of Technology, Atlanta, USA)

15:45 - 17:00 Waves 3: Electromagnetic waves – measurement

Carlos Santamarina (Georgia Institute of Technology, Atlanta, USA)

17:00 - 17:30 COFFEE BREAK

17:30 - 18:30 Waves 4: Tomographic measurements

Steve Hall (Division of Solid Mechanics, Lund University, Sweden)

20:00 DINNER



**23rd ALERT Doctoral School
Aussois, October the 6th 2012**

Advanced experimental techniques in geomechanics

Coordinators:

Cino Viggiani (Laboratoire 3SR / Université Joseph Fourier Grenoble)

Steve Hall (Division of Solid Mechanics, Lund University)

Enrique Romero (UPC Barcelona)

8:45 - 9:45 Experimental multiphase geomechanics 1: Particle-level phenomena and particle-fluid interactions

Carlos Santamarina (Georgia Institute of Technology, Atlanta, USA)

9:45 - 10:45 Experimental multiphase geomechanics 2: Coupled processes (THM, chemo, bio and electrical)

Enrique Romero (UPC Barcelona, Spain)

10:45 - 11:10 COFFEE BREAK

11:10 - 12:25 Experimental multiphase geomechanics 3: Physical model tests to replicate large-scale conditions. Instrumentation for coupled processes

Enrique Romero (UPC Barcelona, Spain)

12:30 - 14:30 LUNCH

14:30 - 16:30 Experimental multiphase geomechanics 4: Multiphase phenomena (non wetting / wetting interfaces). Techniques for multi-scale observations. From micro to phenomenological scale

Enrique Romero (UPC Barcelona, Spain)

17:00 Closure of the ALERT Doctoral School 2012