

Contents

Keynote Lectures

Hydro-mechanical Behaviour of Unsaturated Argillaceous Rocks	3
Bernardo Caicedo, Jairo Martin Espitia, and Luis Vallejo	
Plastic Deformations of Unsaturated Fine-Grained Soils Under Cyclic Thermo-Mechanical Loads	14
C.W.W. Ng and C. Zhou	
Shale Capillarity, Osmotic Suction and Permeability, and Solutions to Practical Testing Issues	29
Russell T. Ewy	
Modelling the Mechanical Behaviour of Callovo-Oxfordian Argillite. Formulation and Application	37
A. Gens, M. Mánica, J. Vaunat, and D.F. Ruiz	
Intrinsic and State Parameters Governing the Efficiency of Bentonite Barriers for Contaminant Control	45
Andrea Dominijanni, Mario Manassero, Giacomo Boffa, and Sara Puma	
Multiscale Approach to Micro-Poro-Mechanical Modelling of Unsaturated Shales	57
Richard Wan and Mahdad Eghbalian	

Feature Lectures

Measurement of Supercritical CO₂ Permeability in Porous Rock at Reservoir Conditions	69
F. Zhang, B. Ye, W.M. Ye, and L. Xua	
Measurement of Mechanical Properties of Thin Clay Films and Comparison with Molecular Simulations	78
Benoit Carrier, Matthieu Vandamme, Roland Pellenq, and Henri Van Damme	

Advanced Meso-Scale Modelling to Study the Effective Thermo-Mechanical Parameter in Solid Geomaterial	85
F. Wuttke, A.S. Sattari, Z.H. Rizvi, and H.B. Motra	
Identification of Local Mechanisms in Clays and Energy-Based Modelling	96
Mahdia Hattab, Jean-Marie Fleureau, and Ching-Shung Chang	
Coupled Membrane and Diffusion Testing of Active Clays for Barrier Applications	104
Charles D. Shackelford	
Evidences of the Effects of Free Gas on the Hydro-mechanical Behaviour of Peat	112
C. Jommi, S. Muraro, E. Trivellato, and C. Zwanenburg	
Unsaturated Behavior of Soils and Shales	
Use of Psychrometers, Capacitive Sensors and Vapour Transfer Technique to Determine the Water Retention Curve of Compacted Bentonite	123
María Victoria Villar, Rubén Javier Iglesias, Carlos Gutiérrez-Álvarez, and Gemma Campos	
Water Content Effect on the Fault Rupture Propagation Through Wet Soil-Using Direct Shear Tests	131
M. Ahmadi, M. Moosavi, and M.K. Jafari	
Specimen Preparation Techniques for Testing Fully and Partially Saturated Sands in Dynamic Simple Shear (DSS) Test Device with Confining Pressure	139
Derya Burcu Gulen and E. Ece Eseller-Bayat	
Measurement of Vertical Strain of Compacted Bentonite Subjected to Hydration Effort on Creep Test	147
Tomoyoshi Nishimura and Keita Iwasaki	
Response of Clay Rock to Moisture Change	155
Chun-Liang Zhang	
Volumetric Behaviour of Lime Treated High Plasticity Clay Subjected to Suction Controlled Drying and Wetting Cycles	165
Marco Rosone, Camillo Airò Farulla, Clara Celauro, and Alessio Ferrari	
Crack Initiation and Propagation of Clays Under Indirect Tensile Strength Test by Bending Related to the Initial Suction	173
Lamine Ighil Ameer and Mahdia Hattab	

Evaluation of the Instantaneous Profile Method for the Determination of the Relative Permeability Function 181
 Anne-Catherine Dieudonné and Robert Charlier

Advanced Laboratory Testing

A Double Cell Triaxial Apparatus for Testing Unsaturated Soil Under Heating and Cooling 191
 Qing Cheng, Raejee Kaewsong, Chao Zhou, and Charles Wang Wai Ng

A Suction- and Temperature-Controlled Oedometric Device 199
 Hugo Troupel, Jean-Michel Pereira, and Matthieu Vandamme

Acoustic Emission Technology to Investigate Internal Micro-Structure Behaviour of Shear Banding in Sands 207
 Wenli Lin, Wuwei Mao, and Junichi Koseki

Direct and Indirect Local Deformations of Sand in Undrained Cyclic Triaxial Tests by Image Analysis Technique 215
 Chuang Zhao, Junichi Koseki, and Yukika Miyashita

A New Laboratory Setup for Phase Equilibria Studies of Methane Hydrate in Porous Media 223
 Brice Y. Kim and I. Yucel Akkutlu

An Experimental Platform for Measuring Soil Water Characteristic Curve Under Transient Flow Conditions 231
 Guanxi Yan, Zi Li, Thierry Bore, Sergio Galindo-Torres, Stefan Schlaeger, Alexander Scheuermann, and Ling Li

Determining Fluid Compressibility and Soil Permeability of Quasi Saturated Sand with the Alternating Flow Apparatus 239
 Jeanne Ewers and Fabian Karl

Effect of Specimen Confinement Method on Simple Shear Test of Clay 247
 Bhagaban Acharya and David Airey

Hydro - Mechanical Behaviour of Shales and Stiff Clays

Fractal Analysis of the Progressive Failure of Shales and Stiff Clays Under Shear 257
 Luis E. Vallejo, Jairo M. Espitia, and Bernardo Caicedo

Recent Developments in Measurement and Use of Fully Softened Shear Strength in the USA 264
 Bernardo A. Castellanos, and Thomas L. Brandon

Chemical Influence of Pore Pressure on Brine Flow in Clay-Rich Material	273
Etienne Cassini, Danila Mylnikov, and Roman Makhnenko	
Development of Classification Charts for Q Index of Shale from the Parameters	281
Nandyala Darga Kumar, Ravikant R. Singh, Faijal Ali, and Efray'im	
Exploring Fissure Opening and Their Connectivity in a Cenozoic Clay During Gas Injection	288
Laura Gonzalez-Blanco, Enrique Romero, Cristina Jommi, Xavier Sillen, and Xiangling Li	
Profiling the <i>In Situ</i> Compressibility of Cretaceous Shale Using Grouted-in Piezometers and Laboratory Testing	296
Laura Smith, S. Lee Barbour, M. Jim Hendry, and D. Elwood	
Influence of Surface Roughness of the Fracture on Hydraulic Characteristics of Rock Mass	304
Wenquan Zhang, Jiudang Yuan, Guibin Zhang, and Bo Li	
Opalinus Clay Shale	
The Role of Anisotropy on the Volumetric Behaviour of Opalinus Clay upon Suction Change	315
Alberto Minardi, Eleonora Crisci, Alessio Ferrari, and Lyesse Laloui	
1D Compression Behaviour of Opalinus Clay	322
Valentina Favero, Alessio Ferrari, and Lyesse Laloui	
Consolidated-Undrained Triaxial Test Results of Opalinus Clay and Comparison with Caprock Shales	330
Silvio Giger, Russell Ewy, and Rudy Stankovic	
One Dimensional Consolidation of Opalinus Clay from Shallow Depth	338
Eleonora Crisci, Alessio Ferrari, Silvio Giger, and Lyesse Laloui	
Lessons Learned from Electron Microscopy of Deformed Opalinus Clay	345
Ben Laurich, Janos L. Urai, Guillaume Desbois, Jop Klaver, Christian Vollmer, and Christophe Nussbaum	
The Rock Mechanical Behavior of Opalinus Clay – 20 Years of Experience in the Mont Terri Rock Laboratory	351
David Jaeggi, Paul Bossart, and Christophe Nussbaum	

Advanced Laboratory Testing for Site Characterization and In – situ Application Studies

Cyclic Testing on Low-Density Chalk 359
 Svend Pilgaard Larsen, Nataša Katić, and Niels Trads

Long Duration Oedometric Tests to Analyse the Creep Behaviour of Lacustrine Sediments 367
 Luca Bonzanigo and Fabrizio Jauch

Deep Soil Mixing Method for the Bio-cement by Means of Bender Element Test 375
 Keeratikan Piriyakul and Janjit Iamchaturapatr

Studying of Shale Organic Matter Structure and Pore Space Transformations During Hydrocarbon Generation 382
 Dina Giliazetdinova and Dmitry Korost

On the Application of Microbially Induced Calcite Precipitation for Soils: A Multiscale Study 388
 Dimitrios Terzis and Lyesse Laloui

Determination of Intergranular Strain Parameters and Their Dependence on Properties of Grain Assemblies 395
 Sparsha Nagula and Jürgen Grabe

Soil-Structure Interactions

Experimental and Numerical Study of the Thermo-Mechanical Behaviour of Energy Piles for Belgian Practice 405
 M. Allani, G. Van Lysebetten, and N. Huybrechts

Drained and Undrained Analysis for Foundations Based on Triaxial Tests 413
 André Arnold, Manuel Krähenbühl, and Andreas Schmid

Impact of Thermally Induced Soil Deformation on the Serviceability of Energy Pile Groups 421
 Alessandro F. Rotta Loria, and Lyesse Laloui

Numerical Analysis of Seismic Soil-Pile-Structure Interaction in Soft Soil with Strong Nonlinearity and Its Validation by 1g Shaking Table Test 429
 Kheradi Hamayoon, Ye Bin, Morikawa Yukihiro, and Zhang Feng

On the Interface Shearing Behavior Between Granular Soil and Artificial Rough Surfaces 437
 Xue-Ying Jing, Wan-Huan Zhou, Hua-Xiang Zhu, Zhen-Yu Yin, and Yangmin Li

Constitutive and Numerical Modelling of Soils and Shales

Constitutive Framework for Unsaturated Soils with Differentiation of Capillarity and Adsorption	447
Yafei Qiao, Wenqi Ding, and Lyesse Laloui	
Coupled Analysis of CO₂ Injection Induced Stress Variation in the Caprock	455
Chao Li and Lyesse Laloui	
Efficient Parameter Identification for THM Behaviour of Claystone Using Optimization Methods	463
Roger Schlegel and Johannes Will	
A Thermodynamic Model for Rate-Dependent Geomaterials	471
Hao Wang and Xiaohui Cheng	
Thermo-Viscoplastic Subloading Soil Model for Isotropic Stress and Strain Conditions.	479
J.R. Maranhã, C. Pereira, and A. Vieira	
Numerical Simulation of Multi-phase Flow in CO₂ Geological Sequestration.	486
X.W. Wang, B. Ye, Y.L. Xiong, F. Zhang, K.Y. Li, and W.M. Ye	
Mechanics and Modeling of Cohesive Frictional Granular Materials	493
S. Singh, R.K. Kandasami, and T.G. Murthy	
Numerical Modelling of Liquefaction Tests of Partially Saturated Sands in CSSLB	501
Seyed Mohsen Seyed Viand and E.E. Eseller-Bayat	
Aspects of Thermal Fracturing of Clays with Electromagnetic Excitation.	509
Morteza Mohamadi and Richard G. Wan	
Reproduction of Discrete Element Model by 3D Printing and Its Experimental Validation on Permeability Issue	517
A. Kondo, S. Matsumura, T. Mizutani, and E. Kohama	
Author Index.	525



<http://www.springer.com/978-3-319-52772-7>

Advances in Laboratory Testing and Modelling of Soils
and Shales (ATMSS)

Ferrari, A.; Laloui, L. (Eds.)

2017, XII, 527 p. 337 illus., 223 illus. in color.,

Hardcover

ISBN: 978-3-319-52772-7