

International Symposium on 'Numerical Analysis of Geomaterials'

Symposium Program

**Tuesday: May 9, 2023**

**Registration:** Palazzo Bernabei, 16:00-18:00

**Wednesday: May 10, 2023**

**Registration:** Palazzo Bernabei, 8:00 onwards

**9:00-9:10 Welcome address** (Aula Magna)

*R. Rettori, Deputy Rector of the University of Perugia; G. Gigliotti, Director of the Department of Civil & Environmental Engineering*

**Feature Lecture**

**9:10-10:10 Chair:** R.L. Michalowski

**A.P.S. Selvadurai**

*Gyan Pande: Memories and appreciation of his life*

*Feature Lecture: 'On the effective permeability of heterogeneous rocks'*

**10:10-10:40 Coffee break**

**A1 - DEM analysis**  
(Room #1)

**10:40 – 11:15 Chair:** J. Andrade

**J. Tejchman (Theme Lecture)**

*'DEM simulations of fracture in pre-flawed marble specimens subjected to uniaxial compression' (D. Tomporowski & J. Tejchman)*

**11:15 – 12:15**

A basic numerical model for hygroscopic swelling particles

*I. Vego, V. Richefeu, A. Tengattini & G. Viggiani*

Modeling capillary transitions in unsaturated media across all saturation regimes

*N. Younes, R. Wan, A. Wautier, O. Millet, & F. Nicot*

Ray-tracing discrete element modeling and in-situ visualization of geo-hazards

*S. Zhao & J. Zhao*

**B1 – Applications: Dams/Foundations**  
(Room #2)

**10:40 – 12:20 Chair:** C. di Prisco

Numerical analysis of seepage in the Obernberg landslide dam

*R. Shafieiganjeh, B. Schneider-Muntau, M. Ostermann & B. Gems*

Numerical simulation of soil liquefaction in a centrifuge test considering the soil preparation method

*C. Saade, Z. Li, S. Escoffier & L. Thorel*

Numerical analysis of liquefaction potential of a tailings dam

*A. Geppetti, J. Facciorusso, G. Ciardi, L. F. Prada-Sarmiento & C. Madiati*

Numerical modelling of the cyclic response of bridge piers subjected to foundation scour

*A. Ciancimino & A. Gajo*

Soil inertia in the macro-response of geotechnical systems: a thermodynamic perspective

*D. N. Gorini*

**12:30-14:00 Lunch** (Palazzo Vallemanni)

**Wednesday: May 10, 2023 - cont.**

**Feature Lecture** (Aula Magna)

**14:00-14:45** *Chair: N. Khalili*

**T. Hueckel**

*'From meniscus instability to drying - cracking of soils: a multi-physics & multi-scale framework'*  
(*F.I. Wu, R.Y. Chen, W. Lindqwister, B. Mielniczuk, M. Veveakis & T. Hueckel*)

**14:45-15:15** **Coffee break**

**A2** - DEM/SPH analysis  
(Room #1)

**15:15 – 15:50** *Chair: J. Tejchman*

**J. Zhao** (*Theme Lecture*)

*'Computational modeling of multiphase fluids interacting with irregular-shaped granular particles'* (*J. Zhao, Z. Lai & S. Zhao*)

**15:50 – 16:50**

DEM-PFV analyses of suffusion phenomena during permeation grouting treatments  
*K. Boschi, B. Chareyre & C. di Prisco*

Hydraulic fracturing process in rocks – small scale simulations with a novel mesoscopic thermo-hydro-mechanical approach  
*M. Krzaczek & J. Tejchman*

Permeable walls for mitigating fast debris flows: a two-phase two-layer depth-integrated SPH-FD modeling  
*S.M. Tayyebi, M. Pastor, A. Hernandez, L. Gao, & M.M. Stickle*

**B2** – Constitutive relations for geomaterials  
(Room #2)

**15:15 – 16:55** *Chair: C. Jommi*

A bounding surface viscoplastic model for rate-dependent behavior of soils including primary and tertiary creep  
*N. Khalili & B. Shahbodagh*

A constitutive model for lightly cemented granular materials  
*C. Rossi, A. Tengattini, C. Viggiani & P. Besuelle*

A cyclic multilaminate constitutive model for sands incorporating anisotropic critical state theory  
*H. Bayraktaroglu, M.A. Hicks & M. Korff*

The computation of soil water retention curves from particle size distributions: assessing the assumptions  
*D. Barreto, E. Imre & J. Leak*

Modular elastoplastic modelling of geomaterials  
*G. Mortara*

**19:00 Reception** (Ristorante San Francesco)

**Thursday: May 11, 2023**

**Feature Lecture** (Aula Magna)

**9:30-10:15** Chair: C. Viggiani

**B.A. Schrefler**

*'Forerunning of fractures in dry and fully saturated porous media; peridynamics and other methodologies'*

*(T. Ni, U. Galvanetto, M. Zaccariotto and B. A. Schrefler)*

**10:15-10:45 Coffee break**

**A3 - THM coupling/ other transient problems**  
(Room #1)

**10:45 – 11:20** Chair: J.F. Shao

**S. Pietruszczak (Theme Lecture)**

*'On coupled hydromechanical analysis of crystalline and argillaceous rocks'*

*(S. Pietruszczak & A.A. Jameei)*

**11:20 – 12:20**

Numerical insight on the role of hydraulic properties on infiltration and evaporation

*M. Aimar, G. Della Vecchia, G. Guida, G. Musso & V.S. Vespo*

A multiphysics model for the near-field evolution of a geological repository for radioactive waste

*U. Vo, M. Fall, J. Infante-Sedano & T. S. Nguyen*

Numerical analysis of hydro-thermal fracturing in anisotropic and heterogeneous rocks

*Z. Yu, J.F. Shao, M. Wang, Y. Sun & M.N. Vu*

**B3 – Applications: Piles and other foundations**  
(Room #2)

**10:45 – 11:20** Chair: R. Salgado

**A. Truty (Theme Lecture)**

*'Modeling piles/barrettes using beam elements and nonlocal kinematic constraints'* (A. Truty)

**11:20 – 12:20**

Finite strain G-PFEM simulation of pile installation in chalk

*M. O. Ciantia & M. Previtali*

Numerical study of the thermal performance of an energy micropile

*G. Ciardi & C. Tamagnini*

Numerical analysis of energy piles subjected to cyclic loads

*C. Iodice, R. Di Laora, C. Tamagnini, G.M.B. Viggiani & A. Mandolini*

**12:30-14:00 Lunch** (Palazzo Vallemani)

**Thursday: May 11, 2023** - cont.

**Feature Lecture** (Aula Magna)

**14:00-14:45** Chair: *T. Hueckel*

**C. Jommi**

*'The hidden phase of organic soils: biogenic gas and hydromechanical response'*  
(*C. Jommi, S. Muraro, W.J. de Wolf & M. Xu*)

**14:45-15:15** Coffee break

**A4** - Constitutive relations  
(Room #1)

**15:15 – 15:50** Chair: *A. Gajo*

**C. Tamagnini** (*Theme Lecture*)

*'Numerical simulation of shear band localization in cemented geomaterials with non-local finite deformation plasticity'*  
(*K. Oliynyk, M. O. Ciantia & C. Tamagnini*)

**15:50 – 16:30**

On modeling of time-dependent behaviour of soils

*T. Nakai, H.M. Shahin & H. Takahashi*

Development of an extended STZ model for granular soils subjected to combined static loading and vibration

*P. Guo, T. Xie & D.F.E. Stolle*

**B4** – Applications: Tunnels  
(Room #2)

**15:15– 16:35** Chair: *H. Schweiger*

Automatic discontinuity extraction based on 3D model of tunnel face  
*H.S. Shin & C. Pham*

Numerical analysis of tunnel face stability in non-cohesive materials with an innovative constitutive model

*L.P. Argani, L. Chino & A. Gajo*

Slip line approach to assess the plastic zone around circular opening excavated in a Hoek-Brown rock mass

*Y.-K. Lee*

Numerical simulation of a centrifuge test on shallow tunnel close to a surface structure

*J. Zhang & E. Bilotta*

**19:00** Conference Dinner (Castello di Petrata)

**Friday: May 12, 2023**

**Feature Lecture** (Aula Magna)

**9:30-10:15** *Chair: R. Wan*

**J.E. Andrade**

*'Data-driven breakage mechanics'*  
(*J. Ulloa, A. Gorgogianni, M. Ortiz & J.E. Andrade*)

**10:15-10:45** **Coffee break**

**A5** - MPM/PFE and other methods  
(Room #1)

**10:45 – 11:20** *Chair: M. Hicks*

**R. Salgado** (*Theme Lecture*)

*'Use of the material point method to solve the boundary-value problems of Soil Mechanics'*  
(*R. Salgado & M. Prezzi*)

**11:20 – 12:20**

Numerical modeling of excavation processes in soft soils using the particle finite element method  
*A. Leon Bal & G. Meschke*

Numerical analysis of CPT in structured soil - parameter calibration and comparison with in-situ data  
*H.F. Schweiger & L. Hauser*

An elasto-plastic macro-element for pile groups under inclined and eccentric loads  
*C. Iodice, M. Iovino, R. Di Laora, L. de Sanctis & A. Mandolini*

**B5** – Coupled processes/ constitutive relations

**10:45 – 12:25** *Chair: P. Bésuelle*

Experimental behavior and constitutive modeling of soils subjected to freeze-thaw cycles  
*M. Sanchez, B. Zhou & Z. Shang*

Numerical modelling of ground freezing-thawing cycle in tunneling  
*R. J. Williams M. & G. Meschke*

Numerical analyses incorporating an interface element for hydro-chemo-mechanical coupling  
*F. Ghalamzan Esfahani & A. Gajo*

APD – an automated system for determining parameters for constitutive models based on in-situ tests  
*I. Marzouk & F. Tschuchnigg*

Using volume averaging technique for modelling of deep mixing  
*A. Abed & M. Karstunen*

**12:30-14:00** **Lunch** (Palazzo Vallemani)

**Friday: May 12, 2023 - cont.**

**Feature Lecture** (Aula Magna)

**14:00-14:45** Chair: *A. Truty*

**R.L. Michalowski**

*'Arching stress distribution in embankments constructed on piled soft soils'*  
(*R.L. Michalowski & K. Brzeziński*)

**14:45-15:15 Coffee break**

**A6 – Localized deformation**  
(Room #1)

**15:15 – 15:50** Chair: *B. Schrefler*

**R. Wan (Theme Lecture)**

*'Constitutive tensor of geomaterials in discrete element modelling for bifurcation analyses'*  
(*M. Farahnak, R. Wan, M. Pouragha & F. Nicot*)

**15:50 – 16:30**

Analysis of the effect of the Lode angle on the strain localization conditions in a porous sandstone  
*C. Couture & P. Bésuelle*

Meso-scale finite element modeling of the fracture process zone evolution in concrete  
*Y. Sun, E. Roubin, J.B. Colliat & J. Shao*

**B6 – Constitutive relations/ other topics**  
(Room #2)

**15:15– 16:35** Chair: *M. Karstunen*

Numerical analysis of elastoplastic behavior of geomaterials as micropolar continua  
*F. Shi, N. Fantuzzi, P. Trovalusci, Y. Li & Z. Wei*

Limit analysis modeling of masonry arch bridge with polygon discretization for backfill  
*Y. Hua & G. Milani*

Probabilistic analysis of an anchored diaphragm wall  
*M. Kawa, W. Puła & A. Truty*

Numerical and experimental investigations into force chain networks in soils: a grading entropy approach  
*J. Leak, D. Barreto & E. Imre*

**16:35 Coffee break (Closure)**