

Contents

Plenary Speakers

Shear Strength Criteria for Rock, Rock Joints, Rockfill, Interfaces and Rock Masses	1
Nick Barton	
Revisiting the Paradigm of Critical State Soil Mechanics: Fabric Effects	13
Yannis F. Dafalias, Xiang-song Li	
Disturbed State Concept (DSC) for Constitutive Modeling of Geologic Materials and <i>Beyond</i>	27
Chandrakant S. Desai	
Three-Dimensional Failure in Geomaterials: Experimentation and Modeling	47
Poul V. Lade	
FEM Implementation of Micropolar Hypoplastic Model	59
J. Lin, W. Wu	
Failure Mechanism and Control of Geotechnical Structures	63
Q. Yang, K.D. Leng, Q. Chang, Y.R. Liu	
Time-Dependent Stress-Strain Behavior of Geomaterials	
Back Analysis of Treporti Test Embankment with a Time Dependent Small Strain Stiffness Constitutive Model	89
Thomas Benz, Valentina Berengo, Paolo Simonini, Martino Leoni	
Rate Dependent Elastoviscoplastic Model	97
Chandrakant S. Desai, Shantanu M. Sane	

Some Strengths and Weaknesses of Overstress Based Elastic Viscoplastic Models	107
T.M. Bodas Freitas, D.M. Potts, L. Zdravkovic	
Comparison of Anisotropic Rate-Dependent Models at Element Level	115
Minna Karstunen, Mohammad Rezania, Nallathamby Sivasithamparam	
A Comparison of Four Elastic Visco-Plastic Models for Soft Clay	121
David Nash, Matthew Brown	
A Rate-Dependent Viscous Model for Sand	125
Fang-Le Peng, P. Chattonjai, Zhen Hua, Ke Tan	
A Review on Creep of Frozen Soils	129
Jilin Qi, Songhe Wang, Fan Yu	
Influence of Recycled Asphalt Pavement on Creep Compliance of Hot Mix Asphalt	135
Pranshoo Solanki, David Adje, Musharraf Zaman, Zahid Hossain	
Simplified Modelling of Isotache Concept for Consolidation	139
Yoichi Watabe, Serge Leroueil	
Nonlinear Creep Behavior of Normally Consolidated Soft Clay	145
Ze-Xiang Wu, Yin-Fu Jin, Zhen-Yu Yin	
Review of Elastic Visco-Plastic Modeling of the Time-Dependent Stress-Strain Behavior of Soils and Its Extensions and Applications	149
Jian-Hua Yin	
Examination on Time-Dependent Soil Models in One-Dimensional Consolidation	159
Yixing Yuan, Andrew J. Whittle	
Constitutive Modeling within Critical State Soil Mechanics	
Criterion for Flow Liquefaction Instability	167
José E. Andrade, Alfonso M. Ramos, Arcesio Lizcano	
Influence of Grain Breakage on Critical State	173
Wei Hu, Zhen-Yu Yin, Christophe Dano, Pierre-Yves Hicher	
Compressible Fluid – An Alternative Concept within CSSM	179
Tomislav Ivšić, Astrid Gojmerac Ivšić	
Investigation of Critical States and Failure in True Triaxial Tests of Clays	185
Victor N. Kaliakin, Andres Nieto Leal	

Micromechanics of the Critical State of Granular Materials	193
N.P. Kruyt	
A Critical State Sand Model with Elastic-Plastic Coupling	199
Ali Lashkari, Ali Golchin	
Influence of Grain Size Distribution on Critical State of Granular Materials	207
Gang Li, Carlos Ovalle, Christophe Dano, Pierre-Yves Hicher	
On Simulation of Strain Localization Using Microplasticity Constitutive Models	211
Majid T. Manzari, Karma Yonten	
Simulation of Isotropic Cyclic Compression by an Elasto-viscoplastic Constitutive Model Based on the Nonlinear Kinematic Hardening Rules	215
Fusao Oka, Sayuri Kimoto	
Rotational Hardening and Uniqueness of Critical State Line in Clay Plasticity	223
Mahdi Taiebat, Yannis F. Dafalias	
A Modified Bounding Surface Hypoplasticity Model for Sands	231
Gang Wang, Yongning Xie	
Soils in Space	239
David Muir Wood	
Unique Quantification of Critical State in Granular Media Considering Fabric Anisotropy	247
Jidong Zhao, Ning Guo, Xiang-song Li	
Peculiarities of Limiting States in Simulated Drained and Undrained Assemblies of Elliptical Particles	253
Leo Rothenburg, Roberto Olivera-Bonilla	
Multiscale and Multiphysics in Geomaterials	
Microstructural Modeling of Granular Materials with Inner Forces	259
Pierre-Yves Hicher	
Time Effects Relate to Particle Crushing in Granular Materials	265
Poul V. Lade	
A Power Law for Elastic Moduli of Unsaturated Soil	271
Ning Lu	

Application and Meaning of the t_{ij} Concept	277
Teruo Nakai	
A Simplified Model for Clayey Rocks Having a Plastic Porous Matrix ...	283
Wanqing Shen, Jianfu Shao, Djimédo Kondo	
Anisotropic Porochemoelectroelastic Solution for Inclined Wellbores with Applications to Operations in Unconventional Shale Plays	289
Minh H. Tran, Younane N. Abousleiman	
Modeling Ground-Shell Contact Forces in NATM Tunneling, Based on 3D Displacement Measurements	293
Shafi Ullah, Bernhard Pichler, Christian Hellmich	
Discrete Modeling of Fluid-Particle Interaction in Soils	297
Jidong Zhao, Tong Shan	
Damage to Failure in Rock Structures	
Realistic Simulation of Progressive Brittle Rock Failure near Excavation Boundary	303
M. Cai	
Excavation Damaged Zone Modelling in Claystone with Coupled Second Gradient Model	313
Frédéric Collin, Benoît Pardoën	
On the Modeling of Transition from a Diffuse to a Localized Damage ...	319
Dashnor Hoxha, Amine Sbitti, Senjen Wu, Naima Belayachi, Duc-Phi Do	
A Micromechanical Model for Time Dependent Behavior Related to Subcritical Damage in Quasi Brittle Rocks	323
Yaoying Huang, J.F. Shao	
Study on Equivalent Rheological Damage Model for Jointed Mass	327
Yaoying Huang, Hong Zheng	
On the Solubilities of Anhydrite and Gypsum	333
Serafeimidis Konstantinos, Anagnostou Georg	
Binary Medium Model for Rock Sample	341
Enlong Liu, Jianhai Zhang	
Study of Rock Bending Failure Mechanism Based on a Proposed Damage Model	349
Hamed Molladavoodi, Ali Mortazavi	
To Which Extend the Failure Mode Originates from Microstructure? ...	359
François Nicot, Nejib Hadda, Franck Bourrier, Luc Sibille, Félix Darve	

Excavation Damage Zone at High Depths: Field Cases and Coupled Analysis	363
Jean Vaunat, Antonio Gens, Benoit Garitte	
A Mohr-Coulomb Failure Criterion for Rocks Subjected to Dynamic Loading	367
Kaiwen Xia	
An Elasto-plastic Model and Its Return Mapping Scheme for Anisotropic Rocks	371
Wei-ya Xu, Jiu-chang Zhang, Ru-bin Wang, Jin-jian Gu	
Micro-Gas Hypothesis for Behaviors of Rocks under Loading	381
Zhong Qi Yue (Quentin)	
Micromechanical Poroplasticity Damage Formulations for Saturated Microcracked Rocks	387
Qi-zhi Zhu, Ni Xie, Jian-fu Shao	
Behaviour of Geomaterials	
Achieving High Range Elastic Properties of Soil Mass for More Stable and Durable Geostructure	391
Gokul K. Bayan	
Effect of Air Entrapment on Unsaturated Flow in Porous Media	399
Pan Chen, Changfu Wei, Jili Wang, Houzhen Wei, Tiantian Ma	
On the Mechanical Behaviour of the Gibraltar Strait Breccias	409
Weixin Dong, E. Pimentel, G. Anagnostou	
Estimation of Tri-axial Behaviour of Pilani Soil Using the Results of Direct Shear Test as a Function of Pore Water Content	417
K. Kumar	
Discrete Element Investigation of the Asymptotic Behaviour of Granular Materials	423
D. Mašín	
Mechanical Behavior of Granular Particles with Different Angularities	431
M.M. Mollanouri.Sh, Ali Aaghar Mirghasemi	
Numerical Simulation of Direct Shear Test Using Elliptical Particles	441
Morteza Naeij, Ali Aaghar Mirghasemi	
Study of Anisotropies Evolution in Direct Shear Test Using Discrete Element Method	451
Morteza Naeij, Ali Aaghar Mirghasemi	

A Micromechanics-Based Modeling the Simple Shear Behaviors of Granular Materials	461
J.G. Qian, Z.P. You, Maosong Huang	
Evolution of Fabric in the Shearing Process Based on Micromechanics	469
Homayoun Shaverdi, Mohd. Raihan Taha, Farzin Kalantary	
Determination of Crystallinity of Alkali Activated Flyash by XRD and FTIR Studies	477
D.N. Singh, Bhagwanjee Jha, Kadali Srinivas	
Stress-Dependency of Intergranular Strain	483
A.B. Tsegaye, B.W. Ygzaw, Thomas Benz	
On Shear-Volume Coupling in Deformation of Soils	491
A.B. Tsegaye, S. Nordal, Thomas Benz	
Influence of Various Experimental Conditions on Shear Behavior of Compacted Sandy Soil under Unsaturated Condition	501
Yuan Zhang, Tatsuya Ishikawa, Tetsuya Tokoro, Satoru Shibuya	
Investigation on Strain Localization of Coal Using Micro-finite Difference Modelling	507
Yixin Zhao, Jingli Han, Yaodong Jiang, Zhongsheng Tian, You Yu	
Constitutive Model	
An Elasto-Plastic Model for Liquefiable Sands Subjected to Torsional Shear Loadings	519
Gabriele Chiaro, Junichi Koseki, L.I. Nalin De Silva	
A Micromechanics Based Model for Cemented Granular Materials	527
Arghya Das, Alessandro Tengattini, Giang Nguyen, Itai Einav	
Modelling the Thermo-Plasticity of Unsaturated Soils	535
Bertrand François, Lyesse Laloui	
Modeling the Dilatancy of Overconsolidated Clay	541
Zhiwei Gao, Jidong Zhao	
Current Situation of Constitutive Model for Soils Based on Thermodynamics Approach	547
Xiao-xia Guo, Xiang Sun, Long-tan Shao, Bo-ya Zhao	
Constitutive Modeling of Cemented Sands Using Critical State Soil Mechanics and Generalized Plasticity Concepts	553
Amir Hamidi, Ehsan Ravanbakhsh	

Comparison between Feature of Modified Cam-Clay Model and UH Model 559
Wei Hou, Yangping Yao

Experimental Investigation and Three Dimensional Constitutive Modeling of Principal Stress Rotation in Shanghai Soft Clay 567
Maosong Huang, Yanhua Liu

From Internal Structure to Constitutive Modeling of Granular Assemblies 577
Xia Li

Extension of Mohr-Coulomb Model into State Dependent Softening of Sand and Its Application in Large Deformation Analysis 583
Xu Li, Yuxia Hu, David White

A Constitutive Model of Sand Considering the State-Dependent and the Effect of Direction of Principal Stress 593
Peng Liu, Maotian Luan, Zhongtao Wang

An Elastoplastic Constitutive Model of Unsaturated Soils with Coupling of Capillary Hysteresis and Skeletal Deformation 599
Tian-tian Ma, Chang-fu Wei, Pan Chen, Hou-zhen Wei

Explicit Incorporation of Asymptotic States into Hypoplasticity 609
D. Mašín

Simple and Unified Modelong of Time-Dependent Behavior for Various Geomaterials 617
Teruo Nakai, Hossain Md. Shahin

Uniqueness of Numerical Experimental Results and Contribution to Constitutive Model by DEM 627
Kiichi Suzuki

Study on Accelerated Creep Properties and Creep Damage Constitutive Relation for Volcanic Breccias 633
Rubin Wang, Weiya Xu, Jiuchang Zhang, Wei Wang

A Research on the Full State Function Constitutive Relation Model 641
Zhenhai Wei, Mengshu Wang, Dingli Zhang

A Generalized Critical State Model for Gas Hydrate-Bearing Sediments 649
Rong-tao Yan, Chang-fu Wei, Hou-zhen Wei, Hui-hui Tian, Er-ling Wu

A Review of Constitutive Modeling of Bonded Soil 657
W.M. Yan

A Unified Description of Toyoura Sand 663
Feng Zhang, Bin Ye, Guanlin Ye

A Structured UH Model 675
Enyang Zhu, Yangping Yao

Application

Incorporation of Soil Suction in Stress-Based Slope Stability Analysis . . . 691
Yong Chen, D. Chan, Yunzhi Tan

Static and Dynamic Analyses of High Core Rockfill Dams..... 701
Weixin Dong, Yuzhen Yu

**Implementation of Numerical Optimization Techniques in
Constitutive Model Calibration** 709
Louis Ge, Honghua Zhao, Bata Bate

**Modeling Damage by Crack Nucleation and Growth in Porous
Media** 715
Dashnor Hoxha, Javad Eslami, Dragan Grgic, Duc-Phi Do

**Large Deformation Analysis of Spudcan Penetration into Sand
Overlying Normally Consolidated Clay** 723
Pan Hu, Dong Wang, Mark Cassidy, Qing Yang

**Application of Data Mining Techniques for the Development of New
Rock Mechanics Constitutive Models** 735
T. Miranda, L.R. Sousa, W. Ruggenthen, R.L. Sousa

**Ground Response Curve (GRC) and Excavation Damage Zone Based
on an Isotropic Damage Model** 741
Hamed Molladavoodi

**Effect of Seismic Wave Form on the Behavior of River Embankment
on the Soft Soil Deposit** 751
Fusao Oka, P.S. Tsai, Sayuri Kimoto

**Integration Algorithms Based on Drucker-Prager Criterion and
Application in Slope Stability Analysis** 757
Yuanwei Pan, Yaoru Liu, Jingjuan Qian, Qiang Yang

**Investigation of Behavioral Aspects of Flexible Pavement under
Various Conditions by Finite Element Method** 765
M.S. Ranadive, A.B. Tapase

Three Dimensional Implementation of HISS Model in ABAQUS 771
Mingqiang Wang, Jun Yang

**Stability Analysis of Shuiwenzhan Landslide under Water Level
Fluctuation and Rainfall in Three Gorges Reservoir 783**
Gang Zeng, Shimei Wang, Yong Chen

Case Study: A Stress Update Algorithm for D-P Constitutive Model 789
Xiaohan Zhang

**Plastic Damage of the Surrounding Rock under the Influence of
Confined Water Pressure and Mining Disturbance 795**
Chunhu Zhao

**3D Large Deformation FE Analysis of Spudcan Foundations on
Layered Clays Using CEL Approach 803**
Jingbin Zheng, Muhammad S. Hossain, Dong Wang

Author Index 811