<table>
<thead>
<tr>
<th>TOPIC</th>
<th>COMPUTATIONAL ADVANCES IN NUMERICAL AND ANALYTICAL METHODS, DIRECT AND INVERSE PROBLEMS, PRACTICAL APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-D Non-Orthogonal Spline Wavelets and Schneider's Level-dependent Scheme for 3-D Boundary Elements Method</td>
<td>Massoud Hooshmand, Khosrow Bargi</td>
</tr>
<tr>
<td>A Bounding Surface Plasticity Model for Soils with Stress Increment Direction Dependent Plastic Potential</td>
<td>Nasser Khalili, Martin Liu</td>
</tr>
<tr>
<td>A Finite Element Study of Beam on Reinforced Granular Beds with Sand Drains</td>
<td>Sarvesh Chandra, C. S. Upadhyay, Imran Ahmad, Arindam Dey</td>
</tr>
<tr>
<td>A New Approach to Rapid 3D Mapping of Rock Mass Structure</td>
<td>Alparslan Turanboy, Erkan Uker</td>
</tr>
<tr>
<td>A Numerical Analysis of Non-destructive Tests for the Maintenance and Assessment of Corrosion of Rockbolts and Rock Anchors</td>
<td>Omer Aydan, S. Tsuchiya, T. Kinbara, F. Uehara, N. Tokashiki, T. Kawamoto</td>
</tr>
<tr>
<td>A Practical Approach for Estimation of Lateral Load on Piles Under Earthquake</td>
<td>Pieter Vermeer, Lars Beuth, Thomas Benz</td>
</tr>
<tr>
<td>A Quasi-Static Method for Large Deformation Problems in Geomechanics</td>
<td>Toshifumi Shibata, Akira Murakami</td>
</tr>
<tr>
<td>A Statistical Model for Slurry Thickening</td>
<td>Shahid Azam, Syed Imran</td>
</tr>
<tr>
<td>A Study of Thermal Behavior of the Openings Effected by High Temperatures</td>
<td>Naoki Kinoshita, Hideaki Yanahara, Yoshinori Inada</td>
</tr>
<tr>
<td>An Experimental Study on the Behaviour of Vertically Loaded Piled Raft on Soft Clay</td>
<td>Sudhir Bajaj, R. B. Sahu</td>
</tr>
<tr>
<td>Analytical and Computational Results for the Interpretation of Cable Jacking Tests on Rock Masses</td>
<td>A. P. S. Selvadurai</td>
</tr>
<tr>
<td>Application of a Multilaminate Model for Soils to Practical Boundary Value Problems</td>
<td>Shahid Azam, Athanasios Papagiannakis, E. Masad</td>
</tr>
<tr>
<td>Application of Cosserat Continuum Approach in the Finite Element Shear Strength Reduction Analysis of Jointed Rock Slopes</td>
<td>F. H. Lee</td>
</tr>
<tr>
<td>Application of Digital Image Processing Techniques for Asphalt Concrete Mixture Images</td>
<td>P. K. Basudhar</td>
</tr>
<tr>
<td>Application of Large Three-Dimensional Finite Element Analyses to Practical Problems</td>
<td>P. K. Basudhar</td>
</tr>
<tr>
<td>Application of Optimization and other Evolutionary Techniques in Geotechnical Engineering</td>
<td>Omer Aydan, S. Tsuchiyama, T. Kinbara, F. Uehara, N. Tokashiki, T. Kawamoto</td>
</tr>
<tr>
<td>Application of Symmetric Galerkin Boundary Element Method on Elastostatic Neumann Problems</td>
<td>Indrajit Chowdhury, Shambhu Dasgupta</td>
</tr>
<tr>
<td>Benchmarking of FEM Technique Involving Deep Excavation, Pile-soil Interaction and Embankment Construction</td>
<td>Stefano Utili, Roberto Nova</td>
</tr>
<tr>
<td>Calibration of Micromechanical Parameters to Reproduce a Frictional Cohesive Continuum by the Distinct Element Method</td>
<td>Omer Aydan, S. Tsuchiyama, T. Kinbara, F. Uehara, N. Tokashiki, T. Kawamoto</td>
</tr>
<tr>
<td>Comparative Analysis on Earthquake Response of Subway Tunnels Between Numerical Simulation and Shaking Table Test</td>
<td>Guo-Xing Chen, Xi Zuo, Hai-Yang Zhaung, Xiu-Li Du</td>
</tr>
<tr>
<td>Comparison Between Finite Element Method and Equilibrium Element Method to Predict Stress Field in Fault-Bend Folds</td>
<td>Pauline Souloumiac, Modaresi Farahmand Razavi</td>
</tr>
<tr>
<td>Comparison of MSSOR versus ILU(0) Preconditioners for Biot's FEM Consolidation Equations</td>
<td>Kok Kwang Phoon, Krishna Babadur Chaudhary, Kim Chuan Toh</td>
</tr>
<tr>
<td>Computation of Soil Penetration at Finite Strains by Using Arbitrary Lagrangian-Eulerian Methods</td>
<td>Daniel Aubram, Frank Rackwitz, Stavros Savvides</td>
</tr>
<tr>
<td>Conventional and Advanced Numerical Methods of Rock Slope Stability Analysis, a Comparison Study, Gotvand Dam Right Abutment (Iran) Case Study</td>
<td>Ahmad Mahboubi, Mohammad Amิงpour, Ali Noorzad</td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Dual Continuum Fluid Flow Simulation in Stress Sensitive Naturally Fractured Reservoirs</td>
<td>212</td>
</tr>
<tr>
<td>Abdal Ravoof Shadi, Mohammad Ali Ashgghi, Nam H. Tran, Ali Al-Sayed, Shwikh Rahaman</td>
<td></td>
</tr>
<tr>
<td>Dynamic Analysis of 3D Saturated Poroeelastic Media with Boundary Element Method</td>
<td>220</td>
</tr>
<tr>
<td>Mortaza Javadi, Mohsen Kamaliyan</td>
<td></td>
</tr>
<tr>
<td>Dynamic Analysis of Geotechnical Problems by Arbitrary Lagrangian-Eulerian Method</td>
<td>229</td>
</tr>
<tr>
<td>Majidreza Nazem, John Carter</td>
<td></td>
</tr>
<tr>
<td>Effect of Arching on Passive Earth Pressure Coefficient</td>
<td>236</td>
</tr>
<tr>
<td>Rupa Santi Dalvi, P. J. Pise</td>
<td></td>
</tr>
<tr>
<td>Efficient Block Preconditioners for the Numerical Modelling of Geological Faults</td>
<td>244</td>
</tr>
<tr>
<td>Massimiliano Ferronato, Giuseppe Gambolioli, Carlo Janna</td>
<td></td>
</tr>
<tr>
<td>Energy Analysis of Hydraulic Fracturing</td>
<td>251</td>
</tr>
<tr>
<td>Aliakbar Golshani, Thanh Tran-Cong</td>
<td></td>
</tr>
<tr>
<td>Estimation of Probable Occurrence of Earthquakes in Chandigarh Region, India</td>
<td>260</td>
</tr>
<tr>
<td>Abha Mittal, R. Dharmaraju, Gayatri Devi</td>
<td></td>
</tr>
<tr>
<td>Evaluation of Free Vibration Characteristics of Steel Space Frames</td>
<td>266</td>
</tr>
<tr>
<td>Bastien Chevalier, G. Combe, P. Villard</td>
<td></td>
</tr>
<tr>
<td>Fast Estimation of the Influence Zone Depth Inside the Subsoil in Relation to the Various Shapes of Footing</td>
<td>281</td>
</tr>
<tr>
<td>Pavel Kuklik, Marie Kopachková, Miroslav Broucek</td>
<td></td>
</tr>
<tr>
<td>Finite Element Investigation of Base Tilt Effect on Shallow Foundation Collapse</td>
<td>289</td>
</tr>
<tr>
<td>J. M. M. C. Marques, R. N. T. Texeira</td>
<td></td>
</tr>
<tr>
<td>Generation and Evaluation on Random Polyhedron Aggregate Model</td>
<td>297</td>
</tr>
<tr>
<td>Jiaxing Wu, Zhengyue Ren</td>
<td></td>
</tr>
<tr>
<td>How Far Does Surface Heave Propagate? A Discussion on Analytical and Numerical Modeling of the Surface</td>
<td>303</td>
</tr>
<tr>
<td>Asanga Sanjeevewee Nanayakkara, Ron Wong</td>
<td></td>
</tr>
<tr>
<td>Importance of Nonlinearity in Finite Element Analysis of a Branched Excavation in Soft Soils</td>
<td>312</td>
</tr>
<tr>
<td>F. Cai, K. Ugai, A. Nakamura</td>
<td></td>
</tr>
<tr>
<td>Influence of the Reinforcement Inclinations on the Mechanical Behaviour of Reinforced Sand Samples</td>
<td>321</td>
</tr>
<tr>
<td>Umberto Arosio</td>
<td></td>
</tr>
<tr>
<td>Lower Bound Shakedown Analysis in Geotechnics</td>
<td>328</td>
</tr>
<tr>
<td>Scott Sloan, Kristian Krabbenhoff, Andrei Lyamin</td>
<td></td>
</tr>
<tr>
<td>Mathematical Model to Predict Swelling of Expansive Soil</td>
<td>336</td>
</tr>
<tr>
<td>Abdullah Al-Mtasiin</td>
<td></td>
</tr>
<tr>
<td>Modeling of Polishing Mechanism in Magnetic Abrasive Polishing</td>
<td>344</td>
</tr>
<tr>
<td>M. G. V. S. RaghuRam, Suhas Joshi</td>
<td></td>
</tr>
<tr>
<td>Modeling Seismic Wave Propagation in 1D/2D/3D Linear and Nonlinear Media</td>
<td>353</td>
</tr>
<tr>
<td>Jean-François Sembat</td>
<td></td>
</tr>
<tr>
<td>Non-Coaxial Theories of Plasticity for Granular Materials</td>
<td>361</td>
</tr>
<tr>
<td>Hai-Sui Yu</td>
<td></td>
</tr>
<tr>
<td>Non-Linear Soil Structure Interaction of Shear Wall System with Super Element</td>
<td>379</td>
</tr>
<tr>
<td>M. S. Fakhrudin, Mahdi Saleh Jafarian, Walied Abdul Thamoon, J. Noorzaei</td>
<td></td>
</tr>
<tr>
<td>Non-stationary Response of Multi-supported Spatially Extended Structures with Continuous Wavelet Transform</td>
<td>386</td>
</tr>
<tr>
<td>Arnab Chakraborty, Bawajit Basu</td>
<td></td>
</tr>
<tr>
<td>Numerical Analysis of the Interaction between Hydraulic Powered Support and Surrounding Rock Strata at Indian Longwall Faces</td>
<td>394</td>
</tr>
<tr>
<td>A. K. Verma, Debasis Deb</td>
<td></td>
</tr>
<tr>
<td>Numerical Homogenization of Elastic Behavior of Fractured Rock Masses and Micro-Cracked Materials by FEM</td>
<td>403</td>
</tr>
<tr>
<td>Ahmad Pouya, Michel Chalhoub</td>
<td></td>
</tr>
<tr>
<td>Numerical Modeling and Analysis of Micro Piled Square Footing in Silty Sand over Limestone Rock in Riyadh</td>
<td>411</td>
</tr>
<tr>
<td>Juan Mayoral, F. A. Flores, Miguel P. Romo</td>
<td></td>
</tr>
<tr>
<td>Numerical Modeling of Liquefaction-induced Lateral Spreading</td>
<td>417</td>
</tr>
<tr>
<td>Juan Mayoral, F. A. Flores, Miguel P. Romo</td>
<td></td>
</tr>
<tr>
<td>Numerical Modelling of EPS Seismic Buffers</td>
<td>425</td>
</tr>
<tr>
<td>Richard Bathurst, S. Zarnani</td>
<td></td>
</tr>
<tr>
<td>Numerical Simulation of a Soilbag Under Vertical Compression</td>
<td>433</td>
</tr>
<tr>
<td>Sendy Tanoto, Erich Bauer</td>
<td></td>
</tr>
<tr>
<td>Numerical Simulation of Mechanized Tunnelling as Part of an Integrated Optimization Platform for Tunnelling Design</td>
<td>440</td>
</tr>
<tr>
<td>G. Merckhe, Felix Nagel, Janosch Staatschmidt, M. Stavropoulou, G. Exadaktylos</td>
<td></td>
</tr>
<tr>
<td>Numerical Simulations of Laboratory Experiments for Determining the Post-Yielding Mechanical Parameters of Soil and Rock</td>
<td>455</td>
</tr>
<tr>
<td>Shunsuke Sakurai, Masato Shinji</td>
<td></td>
</tr>
<tr>
<td>On Finite Element Implementation for Cam Clay Model</td>
<td>462</td>
</tr>
<tr>
<td>Gayatri Chattopadhyay, Rabindra Kumar Bhattacharyya</td>
<td></td>
</tr>
<tr>
<td>On The Determination of Green's Tensor for a Granular Elastic Medium with Application to Wave Propagation in the Random Medium</td>
<td>471</td>
</tr>
<tr>
<td>Gayatri Chattopadhyay, Rabindra Kumar Bhattacharyya</td>
<td></td>
</tr>
</tbody>
</table>
TOPIC 02 CONSTITUTIVE MODELING FOR SOILS AND ROCKS, AND INTERFACES AND JOINTS

A Dimensionless Model for Soil Swelling Behaviour .............................. 638
   Olivier Buzzi, Anna Giacomini, Stephen Fityus
A Hypoplastic Model for Clays Improved for Undrained Conditions .......... 645
   David Masin, I. Berle
A Lode Angle Dependent Formulation of the Hardening Soil Model .......... 653
   Marek Kwasniewski
A Microstructural Model for Cemented Sand ........................................ 661
   Pierre-Yves Hicher, Christophe Dano, Ching Chang
A Multiple-Plane Plasticity Model for Rock Materials. Part I: Definitions of Strength .......................................................... 669
   Fermín Sánchez, Pere C. Prat
A Multiple-Plane Plasticity Model for Rock Materials. Part II: Verification and Applications ...................................................... 678
   Fermín Sánchez, Pere C. Prat
A New Approach to the Modelling of the Pressure-Dependency of the Strength of Rocks .............................................................. 686
   Md. Raquibul Hossain, Mohammed Saiful Alam Siddique, Syed Ishiqiah Ahmad
A Novel Kinematic Hardening Rule to Simulate the Cyclic Behavior of Material ................................................................. 694
   Pawel Nawrocki
A Refined DEM Study of Grain Size Reduction in Uniaxial Compression .... 702
   Oded Ben-Nun, Itai Einav
Advanced Constitutive Model for Unsaturated Structured Soil with Double Porosity ............................................................. 709
   A. Koliiti, Lyene Laloue, L. Valliet
Alterations of Breakdown Pressures in Rocks Exhibiting Stress-dependent Mechanical Properties .................................................. 716
   Pawel Nawrocki
An Energy Based Excess Pore Pressure Generation Model Using Damage Potential ................................................................. 723
   Keun-Bo Park, Seong-Yong Park, Inn Joon Park, Soo-II Kim
Application of a Bond Model for Constitutive Modeling of Cemented Gravelly Sands ............................................................ 732
   Amir Hamidi, Mohsen Haeri
Application of an Uncoupled ALE-formulation to Confined Granular Flow in Silos ................................................................. 739
Michal Wojcik, Jacek Tejchman

Application of the Intergranular Strain Concept to the Hypoplastic Modelling of Non-Adhesive Interfaces ................................................................. 747
Michael Arnold

Can We Trust Numerical Collapse Load Simulations Using Non-associated Flow Rules? ................................................................. 755
Steinar Nordin

Constitutive Modeling of a Jointed Silica Lime Rock ........................................................................................................... 763
Rakesh Kumar, K. G. Sharma, A. Varadarajan

Constitutive Modeling of Rocks, Rock Joints and Rock Masses Including Strain Softening Behaviour ................................................................. 771
Krishan Gopal Sharma, A. Varadarajan, Rakesh Kumar

Constitutive Models for Simulation of Field Performance of Dams ........................................................................................................... 779
Marta Dolezalova, Ivo Hladik

Description of Time-Dependent Deformation in Sedimentary Rocks ........................................................................................................... 789
Stan Pietruszczak, D. Lydza, J. F. Shao

Evaluation of Deformability Properties of Rocks with Overlapping Inclusions by Different Averaging Methods ................................................................. 797
N. Tokashiki, Onem Aydan

Volume 2

Evolution of Dilatancy Angle during Shearing of Kaolin Clay with Different Microfabrics ........................................................................................................... 805
M. Meherjee, Ayanja Sushan

FE-Investigations of Micro-polar Boundary Conditions Along Interface between Soil and Structure ................................................................................................. 813
Jacek Tejchman, Wu Wei

Interpretation of Piezocones in Silt, Using Cavity Expansion and Critical State Methods ........................................................................................................... 822
Christian Leblan, Mark Randolph

Issues in Modeling the Stress-Strain Behavior of Kaolin Clay with Dispersed Microfabric ........................................................................................................... 830
Gyan Vikash, Amit Prashant

Mathematical Modelling of Venetian Sediment Behaviour Using Generalized Plasticity ........................................................................................................... 838
Simoneeta Cola, Laura Tonni, M. Pastor

Mathematical Theory of Plasticity for Frictional Materials ........................................................................................................... 847
Kristian Krabbenhøft

Micromechanics of Rough Interfaces ........................................................................................................... 853
Anil Mire, Orexest Maranges

Microstructural Modeling of Rate-Dependent Behavior of Soft Soil ........................................................................................................... 862
Zhen-Yu Yin, Chang-Shing Chang, Pierre-Yves Hicher, Minna Karstunen

Modeling the Granular Nature of Soils ........................................................................................................... 869
Ian Collins, Bai Qiu, Siyan Wang

Modelling of Degradation of Clayey Soils under Repeated Loading ........................................................................................................... 877
K. V. Srividnya, K. Rajagopal, C. Lakshmana Rao

Modelling the Volumetric Deformation of Naturally Structured Clays during Subyielding ........................................................................................................... 883
Jirayut Suebsuk, Saksun Horphabulsuk, Martin Liu

Modelling Tunnel Performance in Expansive Gypsum Claystone ........................................................................................................... 891
Eduardo E. Alonso, Sebastián Olivella

Multilaminate and Microplane Models: Same Principles and Different Solutions for Constitutive Behaviour of Geomaterials ........................................................................................................... 911
Fermin Sánchez, Pere C. Prat, Vahid Galavi, Helmut Schweiger

Multi-Mechanism Anisotropic Constitutive Model for Granular Materials ........................................................................................................... 920
Annadamang Anuaradathri

Numerical Modelling of the Time-Dependent Behaviour of Venice Lagoon Silts ........................................................................................................... 929
Valentina Berengo, Martino Leoni, Paolo Simontini

Raft and Pile Foundations under Cyclic Loading ........................................................................................................... 937
Simon Meissner, Hubert Quick, Ulvi Arslan

Review of Visco-Plastic Soil Models for Predicting the Performance of Embankments on Soft Soils ........................................................................................................... 945
Md. Rajibul Karim, Carthigesu Gnaneendran

Soil-Structure Interface Modeling: Application to Pile Axial Loading ........................................................................................................... 957
Sofia Costa, D. Aguiar, A. Modaressi Farahmand-Razavi, F. Lopez-Caballero, J. A. Santos

Some Recent Developments in Constitutive Modelling of Soft Clays ........................................................................................................... 966
Minna Karstunen, Zhenyu Yin, Mirva Koskinen, Martino Leoni, P. A. Vermeer

The Characterization of the Grains and the Pores, Applications ........................................................................................................... 976
János Lörincz, Tibor Tarnai, Q. Phong Trang, Emőke Imre, István Tulat, Gábor Telekes, Alexander Schuerermann, Olivier Semar, Karl Josef Witt

The Initial and Induced Fabric Anisotropy of Granular Materials ........................................................................................................... 984
Xia Li, Xiang-Song Li, Hai-Sui Yu

Theoretical Undrained Shear Behaviour of Unsaturated Soils ........................................................................................................... 992
Michinori Honda, S. Ohno, A. Itaka, K. Kawai, H. Ohta

Thermodynamic Basis of Unsaturated Soil Modeling ........................................................................................................... 998
Xiang Song Li
TOPIC 03 MICROCRACKING, FRACTURE, LOCALIZATION, FAILURE

A 3D Generalized Rigid Particle Contact Model for Fracture Analysis ................................................................. 1005
Nuno Monteiro Azevedo, J. Vieira De Lemos, J. Rocha De Almeida

Application of the Elemental Degradation Approach to Problems in Rock Engineering ........................................... 1013
John Harrison

Energy Balance Approach to Shear Band Propagation in Shear-Blade Tests .......................................................... 1024
Erich Sauer, Alexander Pazarin

FE-Modeling of Shear Resistance Degradation in a Sand Body During Cyclic Shearing Under CNS Condition ........... 1032
J. Tejchman, Erich Bauer

FE-studies of a Deterministic and Statistical Size Effect in Granular Bodies Including Shear Localization ................... 1040
Jacek Tejchman, J. Gierski

FRACOD Modeling of Rock Fracturing and Permeability Change in Excavation Damaged Zones .......................... 1048
Ove Stephansson, Baotang Shen, Mikael Rinne, K. Amemiya, R. Yamashi, S. Toguri

Fracture Mechanics for Crack Propagation in Drying Soils .................................................................................. 1060

Hydro-Mechanical Modelling of Underground CO2 Storage and Risk Evaluation through a Probabilistic Fracturing Model .................................................................................................................. 1068
Nicolas Guy, M. Seyedi, Francois Hild

Investigation of the Stress Imaging in Rock Samples using Numerical Modelling and Laboratory Tomography ........ 1075
R. Mitra, E. C. Westman

Modeling Evaporation, Shrinkage and Cracking of Desiccating Soils .................................................................... 1083
Liang Bo Hu, Tomasz Hueckel, Herve Peron, Lyesse Laloui

Modelling Borehole Collapse with Capability of Predicting the Radius Size Effect .................................................. 1091
Panos Papamastorakis, Marc Thieuleux

Modelling of Desiccation Crack Development in Clay Soils .................................................................................. 1099
Susanga Costa, Jayanthu Kodikara, N. I. Thusyanthan

Natural Fracture Patterns in Layered Rocks: Initiation and Propagation Mechanisms ............................................. 1108
Daniel Quesada, Claude Piotot, Dominique Leguillon

Numerical Modeling of Desiccation Cracking in Compacted Soils ......................................................................... 1116
Goldhan Icli

S. Stefanizzi, Giovanni Barla, P. K. Kaiser, G. Grasselli

Numerical Modelling of Orientation of Partly Drained Shear Band ........................................................................ 1132
Vikas Thakur, Steinar Nordal, Aleksandar Sijacic, Hans Petersen, J. Andersen

The Use of Fracture Mechanics for the Study of the Progressive Failure in Geomaterials ......................................... 1140
Claudio Scavia, Marta Castelli

TOPIC 04 COUPLED PHENOMENA, HYDRO- THERMO- CHEMICO- MECHANICAL RESPONSE OF GEOMATERIALS, ELECTRICAL AND THERMAL PROPERTIES OF CLAYS, CLAY MEMBRANE BEHAVIOR

A Column Device to Study THM Behaviour of Expansive Soils ............................................................................. 1149
Manju Mishra, Tom Schanz, Snehashis Tripathy

Consolidation Analysis Using Finite Element Method ................................................................................................ 1157
Krstahamarthy Nayak

Coupled Consolidation and Contaminant Transport in Compressible Porous Media .............................................. 1162
Patrick Fox, Janggun Lee, John Lenhart

Coupled Numerical Simulation of Geothermal Energy Systems ............................................................................... 1170
R. Katzchenbach, Frithjof Claus, Thomask Waterson, Isabel Wagner

Formulations for the Response of Saturated Porous Media: Validity for Geomechanics Problems ........................... 1180
M. B. C. Ulker, M. S. Rahman

Methane Hydrate Bearing Sediments: A New Subject of Geomechanics ............................................................... 1188
Koji Yamamoto

Modelling the Response of Argillaceous Rocks in Underground Excavations .......................................................... 1197
Antonio Gens, Benoit Garitte, Jean Yuavat

Numerical Analysis of the Life-time of an Abandoned Gypsum Mine ................................................................. 1210
D. Bent, G. Busscarnera, Ricardor Castellanoz, Roberto Nova

Numerical Modeling For Mechanical Behavior Of Granular Materials Subjected To Freeze-Thaw Action With DEM .......................................................................................................................... 1219
Tatsuuya Ishikawa, Seichi Miura

Physics and Engineering of Montmorillonite Clay Leading to Discovery of C.N.S.L. Phenomenon ............................ 1227
Ramnath Katti, Anand Katti

Plane Strain Quasi-static Deformation of a Poroelastic Half-space in Welded Contact with an Elastic Half-space due to Tensile Faulting ........................................................................... 1234
Sanita Rani, S. J. Singh

Poro-hydro-thermal Analyses of Heat Transport in the Limestone around the District Heating Tunnel in Copenhagen .......................................................................................................................... 1240
Thomas Kasper
Quasi-static Axisymmetric Deformation of a Porous Half space with Anisotropic Permeability and Compressible Constituents by Surface Loads .......................................................... 1248

Sarva Ji Singh, S. Roni, R. Kumar

Simulating Long Term Reactive Transport of CO₂ in Saline Aquifers with Improved Code RetrasoCodeBright .......................................................... 1255

B. Kvanne, S. Liu

Three Dimensional Analyses of Combined Gas, Heat and Nuclide Transport in a Repository Considering Thermo-Hydro-Geo-Mechanical Processes .............................................................................. 1264

Vijen Javeri, B. Balten

TOPIC 05 TESTING AND MODELING: LABORATORY AND FIELD TESTING, PHYSICAL MODELING, GEOTECHNICAL CENTRIFUGE MODELING

A Comparison Between Angle of Repose and Friction Angle of Sand ........................................................................................................... 1272

A Comparison of the Results of the Numerical Analysis and the Physical Behavior of a Pipe Buried in Reactive Clay ......................................................................................................................... 1276

Chaminda P. K. Gallage, J. K. Kodikara, Derek Chan, Paul Davis

Anchoring Effect of Geotextile in Sand ............................................................................................................................ 1285

Raj Khera

Assessment of Efficiency of Different Cluster Analysis Methods for Evaluation of a Stratigraphy of Strongly Laminated Subsoil ......................................................................................................... 1291

Zb. Mlynarek, J. Wierzchicki, W. Wolanski, W. Tchabacki

Collapses of Underground Cavities and Soil-structure Interactions: Influences of the Position of the Structure Relative to the Cavity ........................................................................................................ 1300

M. Caudron, M. A. Heib, Fabrice Emeriault

Constitutive Modeling of Normal Strength and High Performance Concrete using Hierarchical Single Surface Model ................................................................................................................................. 1308

Musharraf Zaman, Pranesh Solanki, Pei-Yin Chin

Cyclic Lateral Response of Model Pile Groups in Clay ........................................................................................................... 1316

S. S. Chandrasekarar, A. Booninathan, G. R. Dodagoudar

Determination of Coefficient of Permeability From Soil Percolation Test ......................................................................................................................... 1324

Jayantha Fernando

Effect of Erosion on the Hydrogeological Behaviour of Badland Surfaces in Western Canada ......................................................................................................................... 1332

Shahid Azam

Effects of Particle Shape and Microstructure on Strength and Dilatancy During a Numerical Direct Shear Test ......................................................................................................................... 1340

Wai Man Tan

Evaluation of Apparent Co-efficient of Friction between Soil and Nails ......................................................................................................................... 1346

Meneal Gosavi, Swami Saran, Satyendra Mittal

Geotechnical Modelling of the Behaviour of Piles ......................................................................................................................... 1355

Diganta Sarma, M. D. Sarma

Impact of Soil Magnetic Permeability on Water Content Prediction Using TDR ......................................................................................................................... 1365

A. M. O. Mohamed

Laboratory and Numerical Modelling of a Jointed Rock Mass ......................................................................................................................... 1373

Mahendra Singh, Bhawani Singh

Laboratory Investigation of Support Mechanism for Thin Spray-on Liners ......................................................................................................................... 1381

V. Lai, S. Saydam, Yaejun Cai, Budrajit Mitra

Liquefaction of Heterogeneous Soil: Centrifuge Study ......................................................................................................................... 1389

Pradiptra Chhabraborty, Radu Popescu, Ryan Phillips, Hesham Dief

Measurement of Stress Change Tensor by Conical Gauge Probe ......................................................................................................................... 1397

L. Stach, K. Soutey, J. Kozicki, P. Wacławik, L. Palla

Model and Prototype Testing of Well Rings as Foundation for Residential Buildings ......................................................................................................................... 1405

Rexhma. Rajendran, Arves Sujal Johnson, N. Unnikrishnan, P. K. Jayasree

Novel Algorithm for the Estimation of Swell Pressure of Fine-grained Soils Based on Diffuse Double Layer (DDL) Theory ......................................................................................................................... 1413

T. Venkata Bharat, P. V. Sivapullaiah, M. M. Allam

Numerical Study of Neutron Probe Measurement of Water Content in Expansive Soils ......................................................................................................................... 1420

Wensong Huang, Stephen Fityas

Option for Improving the Deformation Behaviour of Compacted Clay Barriers Subjected to Differential Settlements ......................................................................................................................... 1428

Bhamidipati V. S. Viswanadh, S. Rajesh, S. S. Sengupta

Permeability of Charnokite Rock at High Temperatures ......................................................................................................................... 1436


Permeability of Natural Clay Liners: Effect of Accelerated Permeability Testing on Soil Structure ......................................................................................................................... 1443

C. Anderson, V. Sivakumar

Physical Experiments With Medium Granular Models under Lateral Passive Pressure ......................................................................................................................... 1451

P. Kouldeka

Physical Modeling of Seismic Responses of Underground Structures ......................................................................................................................... 1459

O. Kusakabe, J. Takemura, A. Takahashi, J. Izawa, S. Shibayama
Preconsolidation Pressure from Soil Index and Plasticity Properties ................................................................. 1475

Relationship between the Mean Particle Size, the Size Factor, Optimum Moisture Content, and Permeability of Sandy Soils .............................................................................................................................. 1480

Ashok Kumar Gupta

Reliability Estimation of Flow Characteristics Obtained in Laboratory Tests .......................................................... 1486

W. Sas, E. Malinovska, A. Szynanski

Reliability of Inclined Board Test on GCL ..................................................................................................................... 1493

Mustapha Kebaili, A. Bali

Seeing Through the Ground - Mapping the Underworld Project .............................................................................. 1502

N. Meitei, C. D. F. Rogers, D. N. Chapman

Shear Strain Calculation, and Determination of Failure Surface Using Image Processing Technique in Geotechnical Centrifuge Tests

Amin Askarinejad, Habib Shahnazari, Hosseyn Salehzade, Masoud Zare

Shear Viscosity of Clays to Compute Viscous Resistance.......................................................................................... 1516

Sandeep Mahajan, Muniram Badhu

Soil-structure Interface Modelling: Influence of Impregnation .............................................................................. 1524

Diganta Sarma, M. D. Sarma

Some Investigations on Cracking Characteristics of Soils ...................................................................................... 1532

K. Venkataramana, Rao B. Hanumantha, D. N. Singh, C. S. Harendranath, Sudarshan B. Shinde

Swell - Shrink Behaviour of Expansive Soils Under Stabilized Fly Ash Cushions ..................................................... 1539

A. S. Rao, M. Rama Rao

Testing and Modeling the Hydraulic Permeability Evolution of Permeable Reactive Barriers Clogged by Colloids .............................................................................................................................. 1547

Benedic Coeurle, Arzecu Modarexst Fatahmandi, Nazari, Daniel Govenet, Annette Essault-Filet

The Horizontal Capacity of Circular and Square Sheet Pile Foundations on Various Sand Densities ........................ 1555

P. Punrattanasin

The Influence of Porosity on Dynamic Properties of the Snail Soil from the Ljubljana Marsh .................................. 1563

L. Trauner, B. Ziender

The Stress-Strain-Strength Behaviour of a Completely Decomposed Granite Soil Measured Using a New Advanced True Triaxial Testing System .............................................................................................................. 1571

Joanou Yia, Md. Komruszaman

The Study of In-situ Pore Pressure Monitoring of Seabed Soil Under Wave Loading ............................................. 1580

Luen-Kiwei Chien, Wen-Chien Tseng, Tsang-Shen Feng, S. C. Chang

The Use of Dissipated Energy in Cyclic Mobility Modeling ...................................................................................... 1588

Stanislav Lenart

Three-Dimensional Numerical Simulations of Landslide for Slopes with Skewed Anchoring .................................. 1596

Hemanta Hazarika, Tomokazu Ozawa, Yoichi Suzuki, Seishi Okuzono

Use of Retention-Soil-Filter for the Cleaning of Contaminated Water of Infrastructure Surfaces .......................... 1606

B. Katzenbach, B. Artheimer, S. Wachtler, A. Werner

TOPIC 06 ARTIFICIAL INTELLIGENCE TECHNIQUES/METHODS: NEURAL NETWORKS, EXPERT SYSTEMS, RELIABILITY, DATA-MINING, CASE-BASED REASONING, RISK ANALYSIS, GENETIC ALGORITHMS

A Genetic Algorithm for Identification of Slip Surfaces with Minimum Reliability ................................................ 1612

A. Fahd, R. Jimenez

Volume 3

Allowable Pressure of Strip Footing in Spatially Varying Cohesionless Soil - A Probabilistic Approach .......................... 1619

Dasaka Satyanarayana Murty, G. L. Sivakumar Babu

Applicability of Statistical Learning Algorithms for Seismic Attenuation Prediction ........................................... 1627

Sarat Kumar Das, Pijush Samai

Application of Artificial Neural Networks (ANNs) in Prediction and Interpretation of Pressuremeter Test Results .............................................................................................................................. 1634

S. H. Yaseen, M. Emami

Application of Artificial Neural Networks in Coastal Engineering - An Overview ................................................... 1639

S. Mandal, Sanjay G. Patil, Y. R. Manjunatha, A. V. Hegde

Artificial Neural Network Based Backcalculation of Conventional Flexible Pavements on Lime Stabilized Soils ................................................................. 1647

O. Pekcan, E. Tutumluer, M. R. Thompson

Artificial Neural Networks for Coastal and Ocean Studies ......................................................................................... 1655

A. J. T. Davis, Pooja Jain

Artificial Neural Networks for Snow Avalanche Forecasting in Indian Himalaya ................................................... 1664

Amreesh Singh, Ashwagosh Ganju

Comparison of Compaction Control Parameters Obtained by Different Test Methods ........................................... 1671

Selim Altun, Alper Sezer, Yolkan Okur, G. Ozden

Computed Analysis to Determine Service Life Criteria of Special Elements and Applications ................................ 1679

M. Kopecky
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determination of Ground Behavior Using Fuzzy Logic</td>
<td>1686</td>
</tr>
<tr>
<td>Extreme Learning Machine as a New Framework in Predicting Material Properties: Methodology and Comparison</td>
<td>1693</td>
</tr>
<tr>
<td>Forecasting Embankment Dam Behaviour with Artificial Intelligence</td>
<td>1702</td>
</tr>
<tr>
<td>Future Challenges for Artificial Neural Network Modelling in Geotechnical Engineering</td>
<td>1710</td>
</tr>
<tr>
<td>Fuzzy and Neural Network Models for Pollution Concentration Predictions in Streams</td>
<td>1720</td>
</tr>
<tr>
<td>Generalization of Field Measurement Data Based on a Neural Network</td>
<td>1730</td>
</tr>
<tr>
<td>Monitoring, Risk Assessment and Management</td>
<td>1737</td>
</tr>
<tr>
<td>Ground Evaluation by Expert System</td>
<td>1744</td>
</tr>
<tr>
<td>Ground Water Level Fluctuations Using Artificial Neural Network</td>
<td>1750</td>
</tr>
<tr>
<td>Intelligent Controller for Mobile Robot: Fuzzy Logic Approach</td>
<td>1755</td>
</tr>
<tr>
<td>New Method for Generation of Artificial Earthquake Record</td>
<td>1763</td>
</tr>
<tr>
<td>Optimization of Mine Support Parameters Using Neural Network Approach</td>
<td>1770</td>
</tr>
<tr>
<td>Permeability Analysis Based on Information Granulation Theory</td>
<td>1780</td>
</tr>
<tr>
<td>Predicting Horizontal Deformations Under an Embankment Using an Artificial Neural Network</td>
<td>1787</td>
</tr>
<tr>
<td>Prediction of Soil Properties from PCPT Pure Pressure Measurements Using Data Fusion</td>
<td>1795</td>
</tr>
<tr>
<td>Probabilistic Analysis of the External Stability of MSE Structures Using Monte Carlo Simulations</td>
<td>1804</td>
</tr>
<tr>
<td>Probabilistic Reliability Estimation of An Axially Loaded Pile</td>
<td>1811</td>
</tr>
<tr>
<td>Pull Out Capacity Prediction Of Circular Plate Anchors In Cohesionless Soils Using Artificial Neural Networks</td>
<td>1818</td>
</tr>
<tr>
<td>Reliability-based Design of Earth-Fill Dams Considering Spatial Distribution of Strength Parameters</td>
<td>1827</td>
</tr>
<tr>
<td>Risk Assessment of Surface Miner for Estonian Oil-Shale Mining Industry</td>
<td>1836</td>
</tr>
<tr>
<td>Settlement Prediction of Tropical Soft Soil by Artificial Neural Network (ANN)</td>
<td>1843</td>
</tr>
<tr>
<td>Shaft Resistance of Driven Piles Based on CPT and CPTu Results Using GMDH-type Neural Networks and Genetic Algorithms</td>
<td>1850</td>
</tr>
<tr>
<td>Solving Geoseismic Problems with Soft Computing</td>
<td>1859</td>
</tr>
<tr>
<td>Stress-Strain Prediction of Jointed Rocks Using Artificial Neural Networks</td>
<td>1872</td>
</tr>
<tr>
<td>Swelling Pressure of Soil: Artificial Intelligence Technique Approaches</td>
<td>1880</td>
</tr>
<tr>
<td>The Dynamic Control of Crushing Mineral Raw Materials Using Neural Networks Technologies</td>
<td>1885</td>
</tr>
<tr>
<td>The Use of Neural Networks for the Prediction of Swell Pressure</td>
<td>1890</td>
</tr>
<tr>
<td>Updating Uncertainties in Soil Shear Strength Parameters with Multivariate In-situ and Laboratory Test Data</td>
<td>1898</td>
</tr>
<tr>
<td>Vibration Control of Underwater Blasting Works Using Artificial Neural Networks</td>
<td>1906</td>
</tr>
<tr>
<td>Volume Change Behaviour in Calcitic Soil Influenced with Sulphuric Acid Using Artificial Neural Networks</td>
<td>1915</td>
</tr>
</tbody>
</table>

**TOPIC 07 COMPUTERS AND INFORMATION TECHNOLOGY: REAL-TIME INSTRUMENTATION AND MONITORING, RISK ASSESSMENT AND MANAGEMENT**

A Method Study on Data Conversion between 3-D Geological Modeling Software and Numerical Simulation Software | 1922
Correlation Between CBR Strength and Fractal Dimensions of Sands ................................................................. 1928

Decision Support Systems for Geo-Environmental Engineering with Specific Reference to Contaminated Land Investigation ......................................................................................................................................................... 1936

A. Bello-Dambatta, A. A. Javadi, J. Martin

Development and Practical Adoption of an Internet-based Platform for Geotechnical Engineering Projects ................................................................. 1943

M. Majestik, P. Degebrodt, F. Rackwitz, Stavros A. Savidis

Development of an IT-based Monitoring System for Mountain Tunnel Construction ........................................ 1952

Xiaojun Li, Zhigang Li, Wengi Dong, Helina Zhu

International Data Exchange: The Future for Geo-engineering ........................................................................... 1958

David Toll

Landslide Hazard Automated Zonation (LHAZ) System ......................................................................................... 1966

J. K. Ghosh, Devanjani Bhattacharya

Real Time Microseismic Monitoring to Study Geomechanics of Underground Structures .................................. 1972

C. Sivakumar, C. Srinivasan, Y. A. Willy, Ch. S. N. Murthy

Service Oriented Architecture For GIS Applications ........................................................................................... 1980

Pallavi Talegaonkar

TOPIC 08 EMERGING GEOMECHANICS: UNSATURATED SOIL AND ROCK MECHANICS, CARBON SEQUESTRATION, MULTI-PHYSICS & MULTI-SCALE, MICROMECHANICS, NANOMECHANICS, BIO- GEO INTERFACE: MOLECULAR MECHANICS AND MOLECULAR INTERACTIONS IN CLAYS

A Critical Review of the Methodologies Employed for Suction Measurement for Developing the SWCC ................................................................. 1988

Sreedeep Sekharan, D. N. Singh

A Four Elements Porous Model to Estimate the Strength of Unsaturated Soils .................................................... 1994

E. Rojas, Alfredo Zepeda, M. L. Pérez-Rea, Julio C. Leal, G. Gallegos

A General Density Law for Sands .......................................................................................................................... 2003

János Lorincz, Emőke Imre, Kalmán Rajkai, Tom Schanz, Stephen Fitton, Q. Phong Trang, János Puzsztai, Gábor Telekes

A Hyperbolic Model for Stress-strain Behavior of Unsaturated Soils ................................................................. 2012

H. Rahmena

A Multiscale Computational and Experimental Investigation of Swelling Clay Behavior: Bridging Scales Using Steered Molecular Dynamics, Modified Discrete Element Method and Experiments ................................................................. 2022

Dinesh Katti, Kapuna Katti, Santiram Chatterjee, Priyanthi Amarasiri, Steven Schmidt, Pijush Ghosh, Mohammad Matar

A Soil-Water Coupled Analysis of the Deformation of an Unsaturated River Embankment due to Seepage Flow and Overflow .................................................................................................................... 2029

Fuzuo Oka, S. Kimoto, R. Kano, T. Kodaka, S. Sunami

An Investigation of Unsaturated Soil Stiffness ........................................................................................................ 2042

Radhey Sharma, Ananth T. Buddhapatnam

Axial Segregation in Horizontally Vibrated Granular Materials: A Numerical Study ........................................ 2049

Ashish Bhateja, Jayant K. Singh, Ishan Sharma

Biological, the Next Frontier for Advanced Materials Design: Unearthing the Secrets to Extraordinary Mechanical Properties of Nacre, a Biological Nanocomposite ............................................................................................. 2058

Kalpna Katti, Dinesh Katti, Santiram Chatterjee, Shashidra Man Pradhan, Devendra Verma, Pijush Ghosh, Arundhati Bhosle, Jingqun Tang, Bedabibhas Mohanty

Characterization of Some Sand Mixtures ................................................................................................................ 2064

Emőke Imre, János Lőrincz, Pál Rézsa

Cyclic Features of Polygon-shaped Materials Through DEM Simulations ............................................................ 2076

E. Vincents, C. Nouguier-Lehon

Elasto-plastic Modelling of Unsaturated Soils: An Overview ................................................................................. 2084

Daizhao Sheng, D. G. Fredlund

Geotechnical Characterization of Some Indian Bentonites for Their Use as Buffer Material in Geological Repository ................................................................................................................................. 2106

Sudhakar M. Rao, Tahir Ahmad Kachoosa, Mehter M. Allam, M. R. Joshi, A. Acharya

In-situ Soil Carbon Dioxide Flux Measurement From Forest Floor In Karasu Forests In Western Black Sea Region Of Turkey ........................................................................................................................................... 2115

H. V. Oral, Mert Günü, M. Ali Kacuker, Turgut Onay, N. Cropy, O. Yenigün

Modelling the Stress versus Settlement Behavior of Model Footings in Saturated and Unsaturated Sandy Soils ........................................................................................................................................... 2126

Won Taek Oh, Sat K. Vanapalli

Nano and Neutron Science Applications for Geomechanics ................................................................................. 2138

Dayakar Penamadu, Anil K. Dutta, Xin Luo, Kenneth G. Thomas

Non-Isothermal Multi-Component Reactive Transport Model for Unsaturated Soil - Some Numerical Aspects. ................................................................................................................................. 2150

Suresh Sceetharam, H. R. Thomas

Numerical Modeling of Smooth Geomembrane - Soil Interaction ........................................................................ 2158

S. Kazempoor, A. R. Mohabadi, Ali Noorzad

Numerical Particle-Scale Study of Swelling Pressure in Clays ............................................................................. 2165

D. W. Smith, Guillermo A. Narvissil, Peter Pironka

On the Inclusion of Some Biological Impacts and Influences in Coupled Transport Phenomena in Unsaturated Soil........................................................................................................................................... 2172

Hywel Thomas, S. C. Sceetharam
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Study of Economy of Ferrocement with Flyash as an Admixture</td>
<td>2412</td>
</tr>
<tr>
<td>Three-Dimensional Field-Scale Coupled Thermo-Hydro-Mechanical Modelling</td>
<td>2419</td>
</tr>
<tr>
<td>Utilization of Electroplating Waste and Flyash Mixed with Cement</td>
<td>2426</td>
</tr>
<tr>
<td>Analysis of Spatial Moments for Reactive Transport through Fracture - Porous Matrix System</td>
<td>2456</td>
</tr>
<tr>
<td>Critical Review of Applications of Artificial Neural Networks in Groundwater Hydrology</td>
<td>2463</td>
</tr>
<tr>
<td>DEM Modelling of Mud losses into Single Fractures and Fracture Networks</td>
<td>2475</td>
</tr>
<tr>
<td>Critical Review of Applications of Artificial Neural Networks in Groundwater Hydrology</td>
<td>2483</td>
</tr>
<tr>
<td>Analysis of Flow in a Horizontal Toe Filter</td>
<td>2449</td>
</tr>
<tr>
<td>Effect of Stress-Dependant Permeability of the Surrounding Rock and Support System on Seepage Flow in Pressure Tunnels</td>
<td>2497</td>
</tr>
<tr>
<td>Elitist GA Based Evolutionary Algorithm for Groundwater Contaminant Remediation Using Pump and Treat Method</td>
<td>2505</td>
</tr>
<tr>
<td>Incorporating Uncertain Site Information into Groundwater Modeling</td>
<td>2513</td>
</tr>
<tr>
<td>Influence of Unsatitated Soil Properties Uncertainty on Moisture Flow Modeling</td>
<td>2521</td>
</tr>
<tr>
<td>Numerical Upscaling of the Permeability of a Randomly Cracked Porous Medium</td>
<td>2536</td>
</tr>
<tr>
<td>On the Modelling of Internal Soil Erosion</td>
<td>2544</td>
</tr>
<tr>
<td>Simulation of Three Dimensional Circulation Flow Field for Groundwater Pollution Remediation</td>
<td>2551</td>
</tr>
<tr>
<td>Solute Transport in Sandy Soils based on Bulk Electrical Conductivity Breakthrough Curves</td>
<td>2559</td>
</tr>
<tr>
<td>Study of Solute Migration in a Double-Layered Unsatitated Soil Influence of the Position of the Drainage layer on the Retention Capacity of the Sealing Layer</td>
<td>2565</td>
</tr>
<tr>
<td>Swarm Intelligence Based Inverse Model For Laboratory Double - Reservoir Diffusion Experiments</td>
<td>2572</td>
</tr>
<tr>
<td>The Behavior of Two-Phase Flow of DNAPL and Water through Fractured Rock under Confining Pressures</td>
<td>2580</td>
</tr>
<tr>
<td>Three-dimensional Finite Element Method for NAPL (Non-Aqueous Phase Liquid) Contaminant and Subsurface Water Two-phase Flows</td>
<td>2587</td>
</tr>
<tr>
<td>Analysis of Hopper Bottom Cylindrical Silos Subjected to Earthquakes</td>
<td>2595</td>
</tr>
<tr>
<td>Anomalous Behaviour of GPS Based Total Electron Content (TEC) Associated with Earthquakes</td>
<td>2604</td>
</tr>
</tbody>
</table>

**TOPIC 10 FLOW AND CONTAMINANT TRANSPORT IN POROUS MEDIA: SEEPAGE, CONTAMINANT TRANSPORT, FRACTURED MEDIA**
Seismic Active Thrust on Retaining Structures ................................................................. 2875
Mohamed Salah Nourouzi, Guegbi Lyraid

Seismic Analysis of Concrete Gravity Dams Considering Foundation Flexibility and Nonlinearity ................................................................. 2882
Avijit Burman, B. V. Reddy, D. Maiti

Seismic Analysis of Underground Structure Considering Soil Structure Interaction ................................................................. 2889

Site Response Studies for Seismic Hazard Analysis of Kolkata City ................................................................. 2899
L. Govindaraju, Sudhamoy Bhattacharya

Soil-structure Interaction and Damage Analysis using Strength Reduction Factors ................................................................. 2908
L. E. Pérez Rocha, J. Álvarez López

Some Issues in Modeling Boundary Conditions in Dynamic Geotechnical Analysis ................................................................. 2918
Lidija Zdravkovic, Stanisa Kontoe

The Effect of Rayleigh Surface Waves on Dynamic Slope Stabilities ................................................................. 2926
Koji Vennishi

The Umbria-Marche Sequence: Digital Recordings at ENEA Stations ................................................................. 2934
Dario Rinaldi

Time Domain Modeling of Topographic Effects on the Seismic Response of Slopes ................................................................. 2940
Arash Razmkhah, Mohsen Kamalian, Seyed Mohammad Ali Sadroldini

Two-dimensional Numerical Analysis of Homogenous Topographic Features Using BEM ................................................................. 2948
Arash Razmkhah, Mohsen Kamalian, Hamid Alijahb

Ultra Low Frequency (ULF) Bursts As Precursors of Earthquakes ................................................................. 2957
Vinod Kumar Kashwah, Birbal Singh, Virendra Singh

Validation of Commercial Time Domain Finite Difference Codes for 3D Dynamic Soil-Structure Interaction Analysis ................................................................. 2963
Eduardo Botero Jaramillo, Bogart C. Mender, Miguel P. Romo

Vertical Vibration of Full-Scale Single Pile - Testing and Analysis ................................................................. 2970
Bappaditiya Manna, D. K. Basu
d

TOPIC 12 GEO-HAZARD MITIGATION: EARTHQUAKES, HURRICANES, TYPHOONS, CYCLONES, LANDSLIDES, TSUNAMIS

A Probable Isoseismal Map due Maximum Credible Earthquake (M=8.7) in NER, India: An Approach Towards Earthquake Risk Mitigation ................................................................. 2977
Saurabh Barchah

Earthquake Risk Mitigation Strategies in India ................................................................. 2985
C. Ghosh

Forecasting of Damage of Maritime Structures Caused by Typhoons Based on Improved MWS Method ................................................................. 2992
Ryusuke Hashimura

Kriging Interpolation Method and 2.5D GIS Applied in the Probabilistic Estimation of Seismic Site Liquefaction ................................................................. 2998
Guo-Xing Chen, Hao Tang, Shen-Ze Kan

Numerical Modelling of the Motion of Rapid, Flow-like Landslides for Hazard Assessment ................................................................. 3005
Oldrich Hungr

Probabilistic Stability Analysis of Shallow Landslides Using Random Fields ................................................................. 3013
D. V. Griffiths, Jixiang Huang, Gordon A. Fenton

Static Liquefaction for Flow Type Landslide at Karshinga - A Case Study ................................................................. 3021
Gokal K. Bayan

Strategic Approaches For Management of Risk In Geomechanics ................................................................. 3031
R Chowdhury, P. Flentje

The Application of Autoregressive Moving Average Modeling and Determining Safe Places in Minab Zone, Southern Iran ................................................................. 3043
Mohammad Kavei, S. D. Gore, N. J. Pawar, K. Ahmadi, M. Dashian

The Formation of Earth Fissures Due to Groundwater Decline ................................................................. 3051
Maniram Budhu, Amit Shekhe

Tsunami Finite Element Simulation with In-House Code Tsusol and Comparison with Tsunami-N2 Code for National Warning System ................................................................. 3060

Two Major Landslides in Iran and Their Remedial Measures ................................................................. 3069
Arashan Ghatramani

TOPIC 13 FOUNDATION ENGINEERING: SHALLOW AND DEEP FOUNDATIONS, OFFSHORE AND PETROLEUM GEOMECHANICS

A Parametric Study on Raft Foundation ................................................................. 3077
G. S. Kame, S. K. Ukarande, K. Borgaonkar, V. A. Sawant

An Analytical Approach to Lateral Capacity of Rigid Pile in Layered Soil Using Kinematics and Hyperbolic Model ................................................................. 3086
V. Padmanabha, M. R. Madhav, E. Sababba Reddy

Analysis of a Composite Short Rigid Caisson with Compressible Granular Core in Non-Homogeneous Media ................................................................. 3095
S. M. Ali Jawaid, Mandira R. Madhav
Analysis of Pile Using Point Estimate Method
V. A. Savant

Analysis of Single and Group of Piles Subjected to Lateral Load Using Finite Element Method
Krishnamoorthy Nayak, K. J. Sharma

Analysis of Single Piles: Challenges and Solutions
Rodrigo Salgado

Assessment of Bearing Capacity and Settlement of Irregular-Shaped Mat Supported Oil Drilling Rigs Using Finite Element Analysis
Bapum Mahanta, K. S. Prakash, A. R. Deshpande, H. S. Dholey

Comparative Study of Bearing Capacity Estimates of a footing on Jointed Rock Mass by Different Approaches
J. M. Kate, P. K. Nigam

Comparison between the Behaviour of Coated and Uncoated Lightly Loaded Piles in Swelling Soils
Basem Sh. Hazza

Comparison of Different Models for Analysing Foundations on Jet Grout Columns
Franz Tschuchnigg, Helmut F. Schweiger

Constitutive Modelling of San Francisco Bay Mud
Subodh Jain, Anil Nanda

Contribution of Suction Force to Undrained Breakout Capacity of Plate Anchors
S. P. Singh, S. V. Ramaswamy

Contribution to the Efficiency of the Underreamed Piles in the Clay
B. Soldo, K. Ivandic, T. Koprek

Design and Verification of the Foundations of the Dahej LNG Tanks
Joaquin Marti, Francisco Martinez, Takashi Kanekura, D. Takawa, R. Singh

Determination of the Bearing Capacity Factor N Using Upper and Lower Bound Limit Analysis Including Slip Line Method
Vishvas N. Khatri, Jayant Kumar, K. M. Kouser

Development and Performance Study of a New Apparatus to Impart Lateral Cyclic Load on Model Piles
Sudip Basack

Effect of Cavity on Bearing Capacity of Shallow Foundations in Geotextile-Reinforced Soil
Mahmoud Ghazavi, Y. Solangi

Effect of Tie Beams on Settlements and Moments of Footings
Raid Ramezi Al-Omar, L. H. Al-Ebad

Effect on Barrage Raft Floor Due to Intrusion of Rock
Kumar Venkatesh, N. K. Samaddiha, A. D. Pandey

Estimation of Pile Group Behavior Using Embedded Piles
H. Kursat Engin, E. G. Septanika, R. B. J. Brinkgreve

Evaluation of Steel Piles Parameters Effect on Optimization of Pile and Slab Arrangement in Dry Docks with Index Parameter Method
Kh. Bargi, H. Ghorbani

Finite Element Analyses in Offshore Foundation Design
Lars Andresen, Hans Petter Jostad, Knut Henry Andersen, Kristoffer Skau

Flexural Response of Tapered Piles in Liquefied Soils
Shankar Kandukuri, P. K. Basudhar, N. R. Patra

Influence of Combined Vertical and Lateral Loading on the Lateral Response of Piles
Rajagopal Karuppu, S. Karthikeyan

Influence of the Scour on Laterally Loaded Piles
Nanda Kishore Yedla, S. Narasimharao, J. S. Mani

Interaction Analysis for Piled Rafts in Cohesive Soils
Ningombam Thoiba Singh, Baleshwar Singh

Issues in Evaluating Capacity of Socketed Rock Foundations
F. H. Kilhavy, W. A. Prakash

Large Deformation FE Analysis of Plate Anchor Keying in Clay
Yusia Hu, Zhenhe Song

Large Deformation Finite Element Analysis for Offshore Applications
V. A. Savant

Large Settlement of Axially Loaded Pile-Soil Systems
M. S. Ranadive, S. K. Parikh

Linear Settlement of Axially Loaded Pile-Soil Systems
V. A. Savant

Numerical Investigation of Load-Settlement Characteristics of Multi-Edge Shallow Foundations
Mahmoud Ghazavi, S. Mohkthari

Numerical Investigation of Passive Loading on Pile Groups Adjacent to Embankment on Soft Ground
Sangseom Jeong, Donghee Seo, Youngho Kim

Volume 5
Numerical Investigation of the Effect of Recent Load History on the Behaviour of Steel Piles under Horizontal Loading .......................................................... 3361
Khalid Abdel-Rahman, M. Achmad

Numerical Modeling For Laterally Loaded Piles On Sloping Ground .......................................................... 3368
N. Almas Begum, K. Muthukumaran

Numerical Study of Limit Shaft Resistance of Bored Piles in Sand .......................................................... 3376
Dimitrios Loukidis, Rodrigo Salgado

Optimizing Foundation Engineering, Validating Models Against Experience Using Artificial Intelligence .......................................................... 3384
A. M. J. Mens, A. F. Van Tol, A. R. Koelensijn

Pile Load Distributions from Dynamic Pile-to-Pile Interaction Factors .......................................................... 3392
Der-Wen Chang, Bao-Shiun Lin, Shih-Hao Cheng

Pile-Soil-Pile Interaction under Horizontal Loading: A Simple Approach .......................................................... 3399
Mahmoud Ghazavi, P. Ravanshenas

Prediction of Load Displacement Response of Single Pile under Uplift Load: A Comparative Study .......................................................... 3408

Prediction of the Axial Bearing Capacity of Piles by Five-Cone Penetration Test Based Design Methods .......................................................... 3415
Nagwa El-Sakhawy, K. M. Youasf, R. A. E. Budowy

Probabilistic Approach of Design of Pile Foundations in Non-Liquefiable Soils under Seismic Loading .......................................................... 3424
Samanta Haladar, G. L. Sivakumar Babu, Subhamoy Bhattacharya

Production Decline In Petroleum Reservoirs - Influence Of Rock Parameters .......................................................... 3433
M. B. Geilikman, Sau-Wai Wong

Pullout Behaviour of Square Anchors in Reinforced Clay .......................................................... 3441
Phalgum Bhatnacharya, Debiyi Bhowmik, Sibapriya Mulkeren, B. C. Chattopadhyay

Study on Uplift Behaviour of Plate Anchors under Monotonic and Cyclic Loading in Geo-grid Reinforced Sand Bed .......................................................... 3448
P. T. Ravichandran, K. Ilamparamathi, M. Mohammed Toufique

The Effect of External Wings on the Behavior of Suction Anchor .......................................................... 3456
H. Monajemi, H. Abdul Razak

Theory of Elasticity Approach for Strip Footings on Multilayered Soil Media .......................................................... 3464
Priti Maheshwari, M. N. Viladkar

Three-dimensional Finite Element Method Analysis on Steel Pipe Sheet Piles Reinforcement Method for Existing Caisson Foundation .......................................................... 3473
Koichi Isobe, Satoru Ohtsuka, Makoto Kimura

Three-Dimensional Seismic Analysis of Pile Groups .......................................................... 3481
Rajib Sarkar, B. K. Maheshwari

Ultimate Bearing Capacity of Underreamed Pile - Finite Element Approach .......................................................... 3490
Neha Shrivastava, Nikhil Bhatia

Ultimate Lateral Load of a Pile in Soft Clay Under Cyclic Loading .......................................................... 3498
D. M. Dewarkar, S. V. Padmavathi, B. S. Salimath

TOPIC 14 SOIL IMPROVEMENT: STAGED CONSTRUCTION, PRELOADING, DYNAMIC DEEP COMPACTION, SHALLOW AND DEEP SOIL MIXING, SOIL ADDITIVES, REINFORCEMENT, GEOSYNTHETICS, PREFABRICATED VERTICAL DRAINS, VACUUM CONSOLIDATION

A Study on the Effect of Cement on Alluvial Soil Strengthened With Pond and Rice Husk Ash for Construction of Road Subgrade .......................................................... 3508
Tapash Kumar Roy, B. C. Chattopadhyay

Alternative Road Construction Materials Using Modified Soft Soil .......................................................... 3514
Cheeming Chan, Khairul Azhar Ibrahim

Analytical Consideration of Installation Damage Tests for Geogrids .......................................................... 3520
Han Yong Jeon, Abdelmalek Bouazza

Analytical Static Stability Analysis of Slopes Reinforced by Stone Columns .......................................................... 3530
Mahmoud Ghazavi, A. Shahmandi

Bearing Capacity Improvement of Gravel Base Layers in Road Constructions Using Geocells .......................................................... 3538
Ansgar Emersleben, Norbert Meyer

Bearing Capacity of Ring Footings on Reinforced Clay .......................................................... 3546
A. H. Boushehrian, N. Hataf

Behavior of Surface Strip Footing on Geogrid Reinforced Sand Bed .......................................................... 3552
Pratap Kumar Haripal, Rabi Narayan Behera, Chitta Ranjan Patra

Behaviour of Reinforced Embankments on Rate-Sensitive Foundation Installed with Prefabricated Vertical Drains .......................................................... 3559
Chalermpol Taechehakumthorn, R. Kerry Row

Chemical Grouting - Laboratory Study of Chemical Grouts and Geocomposites Properties .......................................................... 3567
Kamil Soucek, Lubomir Stas, Jiri Scucka, Petr Martinez

Design of Geocell Reinforcement for Supporting Embankments on Soft Ground .......................................................... 3575
G. Madhavi Latha

Design of Machine Foundation on Reinforced Sand .......................................................... 3583
A. K. Verma, Darshana R. Bhatt

Effect of Hydrated Lime on the Engineering Behaviour and the Microstructure of Highly Expansive Clay .......................................................... 3590
Abdelmadjid Lasledj, Muazhim Al-Mukhtar
Effect of Lime on Properties of Soil ................................................................. 3599
Jaspal Singh, Atul Kumar, Rakesh Jain, N. K. Khullar

Engineering Performance Evaluation of PVA Geotextiles .......................... 3604
Han-Tong Jeon, Won-Seek Lyoo

Equal-strain Analysis of PVD-enhanced Consolidation Considering Soil Disturbance .......................................................... 3612
Praseenjit Basu, Dipanjan Basu, Monica Prezzi

Evaluation of Different Reinforced Subbases on Expansive Soil ........................... 3621
D. S. Prasad, G. V. R. Prasadra Raju

Evaluation of Fractal Dimension of Injected Sand .................................................. 3628
Abdelghafour Att diaawa, Nadia Sainy, Pierre-Yves Hicher

Finite Element Analysis of a Full Scale Bending Test of Cement Treated Soil Column .................................................. 3635
Tsutomu Namikawa, Junichi Koseki, Yoshio Suzuki

Finite Element Analysis of Arching Behaviour in Soils ........................................... 3642
Vicky J. Potts, Lidija Zdravkovic

Footings on Two Layered Reinforced Soil ......................................................... 3650
Erolind Kumar, Balaji Singh Walia, Swami Saran

Granular Pile-Mat Foundation: Long Duration Model Tests and Numerical Simulation .................................................. 3658
J. T. Shaju, V. Ramana Reddy

Ground Improvement of Clayey Soil Formations Using Stone Columns: A Case Study from Greece ........................................... 3664
Haralambos Saroglou, A. A. Antoniou, S. K. Pataras

Ground Improvement Techniques for Infrastructure Projects in Malaysia .................................................. 3671
V. R. Raju, Yandamuri Hari Krishna

Influence of Curing Time and Composition of Clayey-Soils on Their Engineering and Cement-Stabilization Parameters ................................................. 3683
Evangelos I. Styridakis

Load Carrying Capacity of Random Fiber Mixed Granular Pile .............................. 3692
Partha Basu, N. K. Samaddiya

Moisture Susceptibility and Swelling Behavior of Stabilized Lean Clays .................................................. 3700
Pranshu Solanki, Naiz Khoury, Shubhrajit Zaman

Non-Linear Analysis of Displacements of Granular Pile Anchors (GPA) in Homogeneous Ground ................................................ 3710
B. Vidyarany, M. R. Mudhavi, M. Kumar

Numerical Analysis of Encapsulated Stone Columns ............................................. 3719
S. N. Malavizhi, K. Ilamparuthi

Predicting the Performance of Foundations Near Reinforced Sloped Fills ................. 3727
Jegan Thanupalasingam, Carthigesu T. Gnanendran

Prediction of Pullout Strength of Woven Coir Geotextiles from Yarn Pullout Resistances ................................................ 3735
S. Chandrakaran, E. A. Suhanda, N. Sankar

Preservation of a Homogenized Multi-Phase Model for Reinforced Soil Considering Non-Linear Behavior of Matrix ............................................................................. 3743
Ehsan Seyedi Horsejinta, Orang Farzaneh

Settlement Response of Granular Fill-Soil Reinforced with Extensible Geosynthetics and Stone Columns ................................................ 3751
Kousik Deb, Sarvesh Chandra, P. K. Basudhar

Shrinkage Potential of Clay Liner Mixed with Waste Polythene Chips, Cement and Sand ................................................ 3758
Liaquat Ali, Syed Waqar Hasnain

Slope Stabilization with Jute Geotextile - A Bio-Engineering Approach ................ 3765
P. K. Choudhury, Arindam Das, D. N. Gavwami, T. Sanjai

Stability and Cost Aspects of Geogrid Reinforced Earth Wall of Flyover ................ 3770
R. D. Nalawade, Darshan R. Nalawade

Study on Polypropylene Fiber Reinforced Fly Ash Slopes .................................... 3778
Dushyant Kumar Bhurawaj, J. N. Mandal

The Durability of Stabilized Materials .................................................................... 3787
F. S. Palge-Green

The Effect of Subsoil Support in Plane Strain Finite Element Analysis of Arching in a Piled Embankment ................................................ 3794
Yan Zhang, E. A. Ellis, Hai-Sui Yu

Theoretical Approach of Long-Term Behaviors of Geogrids .................................... 3802
Han-Yong Jeon

TOPIC 15: GEOTECHNICAL STRUCTURES: RETAINING STRUCTURES, FINITE AND INFINITE SLOPES, DAMS, LEVEES, PIPES, CAVERNS, MINES, TUNNELS, BORE-WELL STABILITY, SUSTAINABLE CONSTRUCTION, QUALITY CONTROL

2D Nonlinear Analysis of Asphaltic Concrete - Core Embankment Dams ................ 3812
S. Feizi-Khankandi, A. A. Mirghasemi, A. Ghalandarzadeh, R. Hoeg

3D Effects on Flood Protection Levees - Plain Strain versus Axisymmetric Modelling ................................................ 3820
G. Inci

3D Numerical Analyses of the Soil Variability Impact on Longitudinal Behaviour of Buried Pipes ................................................ 3827
J. Buco, F. Emeriault, R. Kastner

3D Numerical Simulation of Heading Face Support in Partially Saturated Soils for Shield Tunnelling ................................................ 3835
Felix Nagel, Janosch Stascheit, Günther Meschke
3D-Modeling at an Estimation of Construction and Operational Safety of Underground Transport Structures ........................................3843
A Case of Numerical Analysis of Settlements due to Excavation on Nearby Structures .................................................................3849
M. D. Santos, B. B. Dantzig, A. C. C. F. Sieriu
A Case Study on Safety Analysis for Uneven Pressure at Tunnel Portal Site ................................................................................3858
Ho Bon Koo, Seung Hye Kim, Seung Hyun Kim, Jong Hyun Rhee
A Comparative Study of Different Constitutive Relations of Soil in Modelling Shallow Tunnels ......................................................3865
Mohammad Y. Fardam, Bestun J. Nareman
A Numerical Study on the Long-term Performance of an Underground Powerhouse Subjected to Varying Initial Stress State, Cyclic Water Head and Temperature Variations ..................................................3875
O. Aydan, S. Tsuchiyama, T. Kinbara, F. Uehara, T. Kawamoto
Advances in Modeling of Trenchless Pipe Installation and Repair ...............................................................................................3883
Ian D. Moore
Analysis on Active Earth Pressure of Retaining Wall Backfilled with Cohesive Soils by Considering Influence of Cracks ........................................................................................................3891
A. Juneja, S. Dutta
Assessment of Dynamic Response and Stability of an Abandoned Room and Pillar Underground Lignite Mine .............................3899
M. Genis, O. Aydan
Deformation Reinforcement Theory and Its Application to High Arch Dams ..................................................................................3907
J. Khadem Hamidi, H. Bejari, K. Shahriar, B. Rezai
Behavior of Moderately Buried HDPE Pipelines Subject Strike-Slip Faulting ..............................................................................3915
Tarek H. Abdoun, Da Ha, Michael J. O’Rourke
Behavior of Sheet Pile Walls at Deep Excavations in Soft Soils Overlying Hard Rock in Stockholm ................................................3922
J. Ma, B. S. Berggreen, P. F. Bengtsson, H. Stille, S. Hinte
Behaviour of Reinforced Soil Retaining Wall Under Static Loading Using Finite Element Method .............................................3930
Syed Mohd Ahmad, P. K. Basudhar
Design of Vertical Drainage in the Weak Alluvium Beneath a Cofferdam ......................................................................................3946
B. Mahin Roosta, M. Ahmadi
Earth Pressure on Retaining Walls with Reinforced Backfill ........................................................................................................3952
S. Shekarin, A. Ghanbari, M. Makarchian
Earthquake Effect Analysis of Buried Pipelines ..........................................................................................................................3957
Indranil Guha, Raúl Flores Berrones
Elastoplastic Soil Models for Numerical Analysis of Underground Constructions ...................................................................3968
Y. Hejazi, D. Dias, R. Kastner
Evaluation of the Effects of Faulting on Buried Lifelines .................................................................................................................3976
V. Racansky, H. F. Schweiger, R. Thurner
Finite Element Modeling of Long Term Performance of Buried Pipes ............................................................................................3993
Raj Gondle, Hema Siriwardane
Geomechanical Measurements and Computations at an Open Pit Marble Quarry ........................................................................4001
G. Labichino, M. Cravero
Ground Loss Due to Circular Tunnel Deformation in Sands ...........................................................................................................4009
A. Juneja, S. Dutta
Investigation of the Junction Coupling Due to Various Types of the Discrete Points in a Piping System ........................................4016
Ahmad Ahmad, Ali Reza Keramat
Longwall Geotechnical Program at Mimosa Mines .........................................................................................................................4025
Hamid Maleki, Ricardo Mendoza, Mario Santillan
Numerical Analysis of a Novel Piling Framed Retaining Wall System ..........................................................................................4033
Ed L. Branch, Eric C. Drum, Richard M. Bennett, Saeb Haddad
Numerical Analysis of an Embankment Founded on Structured Clay ......................................................................................4041
A. Grammatikopoulos, L. Zdravkovic, D. M. Potts
Numerical Analysis of Flexible Pipe ...........................................................................................................................................4049
M. Javanmard
Numerical Assessment of the Deformation of CFRD Dams During Earthquakes .................................................................4054
A. O. Sfriso
Numerical Modelling and Safety Factor Assessment for a Supported Excavation under Seepage Conditions ....................................4062
D. Steerpi
Numerical Modelling of Geosynthetic Reinforced Retaining Walls ..............................................................................................4071
R. J. Bathurst, B. Huang, K. Hatami
Numerical Modelling of the Instability in Abandoned Mines Induced by Resaturation Process ....................................................4081
J. Rohmer, M. Seyedi, B. Bazargan-Sabet
Numerical Simulation of Directional Drilled Pipelines Placed Under Flexible Pavements ..........................................................4090
M. A. Knight, A. Adelepe

Volume 6
Numerical Simulation of the Mechanical Behavior of Buried Pipes in Trench ..........................................................4098
D. M. S. Gerscovich, A. C. C. F. Sieira, A. M. Ferreira

Pile Movements Induced Instability of Engineered Slopes.................................................................................. 4105
V. Thakur, M. G. Baverford, L. O. Grande

Pipeline Network Infrastructure: Will Technology Revolutionize the Water and Wastewater Industry?………… 4113
Jey K. Jeyapalan

Pseudostatic Analysis of Rigid Retaining Wall for Dynamic Active Earth Pressure.............................................. 4122
Sim Gholam, Gopi Nandan Dey, Bohi Data

Reduction of Blast Induced Ground Vibrations With Open Trenches in Surface Mines .................................. 4132
H. S. Yekateesh, B. Yenumalapala Rao

Research of the Intense Condition of the Transport Tunnel in the Heterogenous Formation Under Action of Various Loadings........................................................................................................................ 4140

Response Surface Methodology (RSM) in the Reliability Analysis of Geotechnical Systems............................ 4147
G. L. Sivakumar Babu, Amit Srivastava

Rock Stress Measurements for Underground Excavations .............................................................................. 4166
A. K. Ghosh

Seepage Analysis through Foundation Using F.E.M. and Flownet...................................................................... 4175
Suvashis Mukhopadhyay

Seismic Retrofit of Embankment Dams Based on Dynamic Nonlinear Analyses.............................................. 4183
M. S. Pi, Mahmood Yazdani, Ali Azad

Slope Stability Analysis of Earth and Rockfill Dam by Numerical Modeling...................................................... 4192
Rajesh Khanna, R. Chitra, Manish Gupta

Stability Analysis of Stratified Soil Slopes by Optimization Technique Using Janbu’s Generalized Procedure of Slices........................................................................................................................................ 4197
K. Arunkumar Bhat, R. Shivashankar, R. K. Yagi

Study of Distribution of Soil Stress Release with Shield Tunnelling .................................................................. 4206
Lian-Jun Tao, Yin-Tao Zhang, Fu Wang, Guang-Yuan Wei

Tailings Dams and Waste-rock Dumps Safety Assessment Using 3D Numerical Modelling of Geotechnical and Geophysical Data..................................................................................................... 4212
S. Mihai, St. Deak, Gy. Deak, I. Oancea, A. Petrescu

Tensor Analysis on the Evolution of Chemical Damage in Limestone.................................................................. 4222
J. X. Wang, L. S. Hu, J. Zhang, Y. Q. Tang, C. Ye

The Cuiia Problem - Reconsidered.......................................................................................................................... 4229
H. P. Roxman, K. Venitha

The Effect of Ground Drainage on the Mechanical Response of Deep Lined Tunnels Excavated in Elastic and Elastoplastic Materials.................................................................................................................. 4236
C. Carranza-Torres, J. Zhao

The Effect of Pipe-Soil Interface Conditions on the Undrained Breakout Resistance of Partially-Embedded Pipelines.............................................................................................................................................. 4249
R. S. Merfield, D. J. White, M. F. Randolph

The Importance of Confinement on Coal Pillar Strength and Overburden Stability............................................. 4257
Hamid Maleki

Time Dependent Deformations in Squeezing Tunnels.......................................................................................... 4265
G. Barla, M. Bonini, D. Debernardi

Tracking Prediction of Stability and Deformation of the Large Underground Structure Group During the Period of Construction................................................................................................................................................. 4276
Shaofan Fu, Bingwen Zhang, Yingyi Yu

Undrained Stability of Dual Square Tunnels............................................................................................................ 4284
D. W. Wilson, A. J. Abbo, Scott W. Sloan, A. V. Lyamin

Uplift Behavior of Shallow Horizontal Anchors Plates in Sand............................................................................ 4292
S. Koprivica

Using Particle Elements to Model the Torino Subsoil Mechanical Behaviour to Improve the Applicability of Microtunnelling Technique...................................................................................................... 4299
M. Barla, M. Camusso

TOPIC 16 INFRASTRUCTURE GEOMECHANICS: TRANSPORTATION GEOTECHNOLOGY, AIRPORTS, CANALS, PAVEMENTS, PORTS AND HARBORS, RAILROADS

A Methodology for Determination of Resilient Modulus of Asphaltic Concrete................................................... 4307

A Simplified Method for Evaluation of Pavement Layers Moduli Using Surface Deflection Data.................. 4314
J. Yakob

Appropriate Standards and Specifications for Surfacing of Low-volume Rural Roads ...................................... 4320
C. Overby, M. I. Pinard

Challenging Tradition: Re-Thinking Conventional Approaches To The Provision Of Rural Roads In Southern Africa .................................................................................................................................................. 4326
M. I. Pinard
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Development and Numerical Modelling of Vegetation Induced Suction and Implications on Rail Track Stabilisation</td>
<td>4335</td>
</tr>
<tr>
<td>Dealing with Road Subgrade Problems in Southern Africa</td>
<td>4345</td>
</tr>
<tr>
<td>Dynamic Mechanical Analysis of Performance Grade Asphalt Binder</td>
<td>4354</td>
</tr>
<tr>
<td>Effect of Clay on Soil Cement Blocks</td>
<td>4362</td>
</tr>
<tr>
<td>Experimental Investigation and Numerical Analysis of Reinforced Geologic Media</td>
<td>4369</td>
</tr>
<tr>
<td>Flexible Pavement Response to Multiple Wheel Loading Using Nonlinear Three-dimensional Finite Element Analysis</td>
<td>4377</td>
</tr>
<tr>
<td>Laboratory Study for Evaluation of Membrane Effect of Geotextile in Unpaved Road</td>
<td>4385</td>
</tr>
<tr>
<td>Modelling Reclamation Process and Its Response to Applied Loads</td>
<td>4392</td>
</tr>
<tr>
<td>Numerical Modelling of Railway Tracks with Ballast and Sub-Ballast Layers Using Critical State Parameters</td>
<td>4400</td>
</tr>
<tr>
<td>Open Graded Asphalt Concrete for Mitigation of Reflection Cracking on Asphalt Concrete Overlays</td>
<td>4409</td>
</tr>
<tr>
<td>PFWD, CBR and DCP Evaluation of Lateritic Subgrades of Dakshina Kannada, India</td>
<td>4417</td>
</tr>
<tr>
<td>Roller-Integrated Compaction Monitoring Technology: Field Evaluation, Spatial Visualization, and Specifications</td>
<td>4424</td>
</tr>
<tr>
<td>Shakedown Analysis of Road Pavements</td>
<td>4432</td>
</tr>
</tbody>
</table>

**TOPIC 17 SLOPE STABILITY: NATURAL SLOPES, DEEP SEATED GRAVITATIONAL MOVEMENTS, LANDSLIDES, ROCK AVALANCHES, ROCK FALLS, FLOWS AND GLACIER MECHANICS**

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Case Study on the Stability and Numerical Analysis of the Collapsed Cut-Slope in Danyang, Korea</td>
<td>4439</td>
</tr>
<tr>
<td>A More General Model for the Analysis of the Rock Slope Stability</td>
<td>4444</td>
</tr>
<tr>
<td>A Study on Debris and Earth Flow on National Highway-39, Near Kohima, Nagaland</td>
<td>4453</td>
</tr>
<tr>
<td>Advance Methods of Slope-Stability Analysis for Earth Embankment with Seismic and Water Forces</td>
<td>4461</td>
</tr>
<tr>
<td>Advanced Calculations of Safety Factors for Slope Stability</td>
<td>4470</td>
</tr>
<tr>
<td>Assessing the Influence of Climate Change on the Progressive Failure of a Railway Embankment</td>
<td>4478</td>
</tr>
<tr>
<td>Comparative Study of Stability of Man Made Slope by Limit Equilibrium Method and Geo5 Software</td>
<td>4487</td>
</tr>
<tr>
<td>Constitutive Modeling and Testing of Glacial Tills for Prediction of Motion of Glaciers</td>
<td>4494</td>
</tr>
<tr>
<td>Differences between LE and FE Methods Used in Slope Stability Evaluations</td>
<td>4509</td>
</tr>
<tr>
<td>Effect of Rock Fall Geometries Impacting Soil Cushion: A Numerical Procedure</td>
<td>4517</td>
</tr>
<tr>
<td>Estimate of Groundwater Distribution from Drainage and Deformation of a Slip Zone in a Large-scale Landslide Area</td>
<td>4525</td>
</tr>
<tr>
<td>Evaluation of Landslide Behaviour Based on Geological and Geotechnical Investigations in Sikkim Himalaya - A Case Study</td>
<td>4533</td>
</tr>
<tr>
<td>Experimental Reproduction of Rockslide Debris Fragmentation with Parent Rock Structure Retention</td>
<td>4540</td>
</tr>
<tr>
<td>Extension of the Fringe Projection Method to Measure Shape and Position of the Centre of Mass of Granular Flow Deposit</td>
<td>4547</td>
</tr>
<tr>
<td>Generalized Method of Optimum Design of Nailed Soil Slopes</td>
<td>4555</td>
</tr>
<tr>
<td>Instrumentation and Real Time Monitoring of Slope Movement in Hong Kong</td>
<td>4563</td>
</tr>
</tbody>
</table>
Investigation of the Geomechanical Aspects of a Large Landslide by Means of a Finite-element Method : A Case Study ..............................................................4577
B. François, Ch. Bonnard, J. Laloui

Local Identification of Geo-System Response using Shape-Acceleration Arrays .........................................................................................................................4586
M. Zeghal, T. Abdoun, A. Elmekatif, V. Benneti, L. Danisch

Mechanism and Analysis of Large and Long-distance Sliding Slope Failures due to the 2004 Niigata-ken Chuetsu Earthquake ..........................................................4593
K. Ugai, A. Wakai, A. Onoue, S. Kuroda, K. Higuchi

Misuse of Computational Methods in Engineering Practice ..................................................................................................................4600
Farrokh N. Screwvala

Numerical Simulation for a Landslide Induced by Cyclic Shearing During Earthquake ...........................................................................................................4606
A. Wakai, K. Ugai, A. Onoue, S. Kuroda, K. Higuchi

Probabilistic Methods Applied To Unsaturred Numerical Modeling ..........................................................................................................................4614
Murray Fredlund, Gitson Gitrana

Rainfall Induced Shallow Landslides on Sandy Soil and Impacts on Sediment Discharge: A Flume Based Investigation ..................................................................4620
G. Acharya, T. A. Cochran

J. B. Martins

Simplified Numerical Analysis of the Strengthening Effect of Soil Nails in a Loose Fill Slope .................................................................................................4637
Y. D. Zhou, L. G. Tham, J. Li, E. C. Y. To, K. Xu

Stability Against Translational Failure of Non-cohesive Embankments Founded on Natural Slopes ..................................................................................4645
L. Pantelidis

Stability Analysis of Harmony Landslide in Garhwal Himalaya, Uttarakhand State, India ........................................................................................................4652
R. Anbalagan, Atul Kohli, D. Chakraborty

Study of Rockfall and Subsidence at km 41 on Mumbai - Pune Expressway - A Case Study ...........................................................................................................4659
Kishor Kumar, P. S. Prasad, Sudhir Mathur, N. K. Goyal

Support Vector Machine and Relevance Vector Machine Classifier in Analysis of Slopes ..................................................................................................4667
Piyush Samui, Gautam Bhattacharya, Sarat Kumar Das

Towards Understanding of Lanta Khola Landslide in Sikkim Himalayas .........................................................................................................................4675
Anuradha Sengupta, K. Anbarasu, SaiBal Gupta

TOPIC 18 CASE HISTORIES: PREDICTION, PERFORMANCE AND EVALUATION, FORENSIC STUDIES, BACK ANALYSIS: PRE-Failure AND FAILURE

A Case Study on the Importance of Local Geology on Selection of Cut-off Wall Construction Procedure ........................................................................4683
Gülgün Yilmaz, Selim Iliz, Turhan Karadayılar, Ali Güney

Assessment of the Stability Conditions of Ancient Underground Quarries Through on Site Monitoring and Numerical Modelling .................................................................4689
A. M. Ferrero, A. Segalini, M. D'Attoli

BBC W1 Development Case Study - Tunnel and Construction Monitoring ...........................................................................................................4698
M. Veziri, P. Steen

Elasto-viscoplastic Numerical Analysis of a Deep Excavation in an Osaka Soft Clay Deposit Using the Open-cut Method ........................................................................4709

Finite Element Analysis of Four Levees Considering Soil Anisotropy .........................................................................................................................4716
R. Singh, D. Roy, D. Misra

Geotechnical Analysis of Failure of Amona Jetty in Goa .................................................................................................................................4723
D. V. Karandikar

Influence of Anisotropy, Destrustruction and Viscosity on the Behavior of an Embankment on Soft Clay ........................................................................4728
Z. Y. Yin, M. Karstunen

Prediction of the Geotechnical Effects Induced by Deep Drainage in Urban Area ........................................................................................................4736
A. Cividini, S. Bonomi, G. C. Vignati, G. Gioda

Rehabilitation of Earthquake affected Tapar Dam, Gujarat, India .........................................................................................................................4744
S. M. Tudor, R. Mishra, B. K. Samtani

Static Liquefaction Analysis Using Simplified Modified State Parameter Approach for Dredged Sludge Depot .................................................................4748
B. François, Ch. Bonnard, J. Laloui

Hollandsch Dicp ..................................................................................................................................................................................................................................................4757

The Value of Exact Theory in Geotechnical Engineering .................................................................................................................................4763
Farrokh N. Screwvala

Theoretical and Observed Behavior of ‘Meter Panels’ ...............................................................................................................................4771
V. T. Gangule, G. S. Parab, V. V. Vaidya

Typical Bridge Foundations - Selected Cases ........................................................................................................................4777
P. K. Jain, Rakesh Kumar, Anand Selot, S. K. Mittal
TOPIC 19 GEOMECHANICS FOR ANCIENT MONUMENTS, PRESERVATION AND REHABILITATION

Converting Entrance Hall into Convocation Hall, in Bharathidasan University, Tamilnadu .......................................................... 4778
I. Murugan, C. Natarajan, A. Rajaraman

Cooperation Between Restoration and Retrofitting of Monument Enshrines Imamzadeh Ja’far After Darb-e-Astaneh Earthquake (31 March 2006) ........................................................................................................................................ 4786
Hamid Reza Vosoughifar, Arash Razzmkhah

Dynamics of Rock Blocks in Traditional Construction .......................................................................................................................... 4793
S. Shifina Fatima, I. Murugan, C. Natarajan, A. Rajaraman

Geotechnical Appraisal of Rock-cut Temples at Masur, Dist. Kangra, Himachal Pradesh ........................................................................ 4801
V. K. Sharma, Pankaj Kumar, Hemant Kumar

Geotechnical Investigation and Scientific Conservation of Excavated Site "Rani Ki Vav Patan" .................................................................. 4807
V. R. Mangiraj, M. S. Uniyal

Hydrogeology of the Cradle of Humankind World Heritage Site, South Africa ..................................................................................... 4811
K. T. Witthäuser, M. Holland

Rehabilitation and Preservation of Structures for Religious Purposes ............................................................................................................ 4819
C. Natarajan

Traditional Construction in Southern Peninsula-knowledge Extraction ........................................................................................................... 4824
I. Murugan, C. Natarajan, A. Rajaraman

TOPIC 20 GEOTECHNICAL EDUCATION AND PROFESSIONAL PRACTICE

BBC W1 Development Case Study - Tunnel Movement Class A Predictions ......................................................................................... 4830
Mohsen Vaziri, T. Hartlib

Challenges for Geotechnical Engineering Education ............................................................................................................................. 4841
J. N. Jha, K. S. Gill, A. K. Choudhary

Concept of the NATM in China and Its Influence on the Numerical Analyses on Tunnel Design and Construction with FEM .................................................................................................................................................. 4846
Jianqin Ma, B. F. Berggren, H. Stille

Need for Continuing Education for Civil Engineers and ASCE's Role in Providing this Education .......................................................... 4855
Sanjeev Kumar, John Casazza

Role of G-IT in Soil Identification .............................................................................................................................................................. 4864
Pradeep Kumar, Praveen Kutti

Author Index