

GeoCongress 2012

State of the Art and Practice in Geotechnical Engineering

Geotechnical Special Publication No. 225

**Oakland, California, USA
25-29 March 2012**

Volume 1 of 6

Editors:

**Roman D. Hryciw
Adda Athanasopoulos-Zekkos
Nazli Yesiller**

ISBN: 978-1-61839-964-9

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2012) by the American Society of Civil Engineers
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact the American Society of Civil Engineers
at the address below.

American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 20191

Phone: (800) 548-2723
Fax: (703) 295-6333

www.asce.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

FOUNDATIONS

RECENT ADVANCES IN FOUNDATION ENGINEERING

Numerical Simulation of Column Supported Embankments with Geosynthetic Encased Columns:	
Influence of Soft Soil Constitutive Model	1
<i>Majid Khabbazian, Victor N. Kaliakin, Christopher L. Meehan</i>	
Variation of p-Multipliers for Pile Groups in Clayey Soils	11
<i>E. M. Comodromos, M. C. Papadopoulou, N. S. Klimis</i>	
Dynamic Interaction of Two Nearby Machine Foundations on Homogeneous Soil.....	21
<i>P. Vivek, Ghosh Priyanka</i>	
Behaviour of a Strip Footing near Slope Crest under Vertical Cyclic Loading	31
<i>M. A. Islam, C. T. Gnanendran</i>	
Statistical Analysis on Socket Depth of Pile.....	41
<i>Guoliang Dai, Weiming Gong, Lijun Meng</i>	
Numerical Modeling of Piles Subjected to an Underground Lateral Load.....	51
<i>Jie Huang, Sazzad Bin-Shafique</i>	
Consolidation of Ground with Prefabricated Vertical Drains Combined with Time-Dependent Surcharge Loading in Membrane System	60
<i>B. Indraratna, X. Y. Geng, C. Rujikiatkamjorn</i>	
Field Behavior of Jet Grouting Pile under Vacuum Preloading of Soft Soils with Deep Sand Layer	70
<i>Wen-jun Han, Song-yu Liu, Ding-wen Zhang, Guangyu Du</i>	
On Pile Driving in the Offshore of the Arabian Peninsula: The Status Quo and Major Concerns	78
<i>Waddah Akili</i>	
Construction and Analysis of Cast-in-Place Tubular Piles	87
<i>R. Y. Liang, H. L. Liu, G. Q. Kong</i>	
Separated Resistance Factors of Drilled Shafts Based on O-Cell Tests.....	97
<i>Xinbao Yu, Murad Y. Abu-Farsakh</i>	
Shallow Foundation Design over Diagenetic Limestone along the Arab Gulf Coast: An Overview	105
<i>Waddah Akili</i>	
Updated CS2 Model for Large Strain Consolidation of Clay	115
<i>Hefu Pu, Patrick J. Fox</i>	
Parametric Studies on Application of CPRF on Semi Soft Stratified Soils.....	125
<i>Henok F. Gebregziabher, Rolf Katzenbach</i>	
Measured Soil-Pile Interaction for Small Diameter Piles Embedded in Granular Soil Subjected to Lateral Soil Movement	135
<i>Muhammad T. Suleiman, Anne Raich, Lusu Ni, William Kingston, Timothy W. Polson, Jeffery Helm</i>	
Development and Interpretation of Geotechnical Contract Provisions for Design-Build Projects: Success Strategies for Owners and Contractors.....	145
<i>Elizabeth M. Dwyre, John Jenkins, Raymond J. Castelli</i>	
Field Stiffness Reduction Evaluations from Back-Analysis of Pile Load Tests	155
<i>F. S. Niazi, P. W. Mayne</i>	
Evaluation of Performance Criteria for Short Laterally Loaded Drilled Shafts.....	165
<i>P. M. Kandaris, A. M. DiGioia Jr., Z. J. Heim</i>	
A Laboratory Process to Determine the Tim-Dependent Increased Interface Frictional Behavior between Soil and Construction Materials.....	175
<i>E. J. Steward</i>	
Pseudo-Static Uplift Capacity of Obliquely Loaded Horizontal Strip Anchor in Cohesionless Soil.....	185
<i>Sunil M. Rangari, Deepankar Choudhury, D. M. Dewaikar</i>	
New Findings from Centrifuge Modeling of Rocking Shallow Foundations in Clayey Ground	195
<i>M. Hakhamaneshi, B. L. Kutter, L. Deng, T. C. Hutchinson, W. Liu</i>	
Analysis of Laterally Loaded Piles in Liquefiable Soils with a Frozen Crust	205
<i>Qiang Li, Xiaoyu Zhang, Zhaojun Yang</i>	

Analysis of Laterally Loaded Piles in Frozen Soils	215
<i>Zhaohui Yang, Qiang Li, Jacob Horazdovsky, Leroy Hulsey, Elmer Marx</i>	
Guidelines for the Application of Base Grouting for Drilled Shafts.....	225
<i>Raymond J. Castelli</i>	
Applications of Drainage Consolidation Techniques Treating the New Reclaimed Land.....	235
<i>Zhiliang Dong, Pingshan Chen, Gongxin Zhang, Yan Luo, Jia Liu</i>	
Theoretical and Numerical Analysis of Jacked Pile in Sand.....	245
<i>Zhengxing Wang, Linchang Miao, Fei Wang</i>	
Comparison of Predicted and Actual Loads on Piles Using a Combined Analysis Model.....	255
<i>Evelio Horta, Ross McGillivray</i>	
Use of In Situ Tests for Design of Drilled Shafts in Coarse Granular Deposits.....	265
<i>Samer R. Rabab'ah, John C. Niedzielski, Dean B. Durkee</i>	
Determining Unknown Bridge Foundation Depth by Resistivity Imaging Method	275
<i>M. S. Khan, M. S. Hossain, J. Hossain, G. Kibria</i>	
Empirical Method for Settlement Prediction of Single Piles Using Higher Order Neural Network and Particle Swarm Optimization	285
<i>Abdussamad Ismail, Dong-Sheng Jeng</i>	
Development of a Database for Pile Load Tests.....	295
<i>M. C. Marcos, S. S. Lin, M. R. Liao, J. K. Huang, Y. J. Chen</i>	

FOUNDATIONS FOR ENERGY INFRASTRUCTURE

Tension Tests on Driven Fin Piles for Support of Solar Panel Arrays	305
<i>Alan J. Lutenegeger</i>	
Lateral Capacity of Helical Piles—Actual vs. Theoretical Foundations for Solar Power Plants	315
<i>G. L. Seider, J. B. Chisholm</i>	
Application of Drilled Shaft Foundations for Utility Scale Wind Turbines in a High Seismic Environment	326
<i>Matthew G. Rogers, Eric M. Ntambakwa, Shin-Tower Wang, Troy Crook</i>	
Framework for Scaling 1g Model Pile Tests for Offshore Wind Structures.....	336
<i>Aaron S. Bradshaw</i>	
Numerical Analysis of Shallow Foundations under Combined Horizontal and Torsional Loading.....	346
<i>H. Nouri, G. Biscontini, C. Aubeny</i>	
New Design Approach for Large Diameter Offshore Monopiles Based on Physical and Numerical Modelling.....	356
<i>F. Rackwitz, S. Savidis, E. Tasan</i>	
Friction Effects on Lateral Loading Behavior of Rigid Piles	366
<i>V. Zania, O. Hededa</i>	

STATE OF PRACTICE: LRFD METHOD IN GEOTECHNICAL ENGINEERING

Application of Monte Carlo Simulation to Laterally Loaded Piles	376
<i>Haijian Fan, Robert Liang</i>	
Evaluation of AASHTO Load Factor and Resistance Design Methods for Benchmarked Braced Excavations	385
<i>D. C. Konstantakos, D. Mamoglo</i>	
Resistance Factors for MSE Wall Sliding and Overturning Checks	395
<i>Dongwook Kim, Rodrigo Salgado</i>	
Determination of Shaft and Base Resistance Factors for Drilled Shaft Embedded in Rock in Korea	405
<i>Seok-Jung Kim, Oh-Sung Kwon, Myoung-Mo Kim</i>	
Foundations for the Bridge at Pitkins Curve	414
<i>John P. Turner, John D. Duffy, Reid Buell, Xing Zheng</i>	

EARTH STABILITY

STABILITY OF MANMADE AND NATURAL SLOPES AND EMBANKMENTS

Soil Shear Strength Enhancements from Plant Root Tempered Georeinforcements	424
<i>Drew W. Johnson, Miguelangel Saucedo, Sazzad Bin-Shafique, Jie Huang</i>	

The Behaviour of Embankment Soil with Time.....	432
<i>M. M. Y. Ali, J. Kuwano</i>	
Cracks in Slopes: Limit Analysis Approach to Stability Assessment	442
<i>Radoslaw L. Michalowski</i>	
Excavation Difficulties in a Stiff Fissured Clay and a Reinforced Earth Wall Solution.....	451
<i>Chrysanthos Steiakakis, Zach Agioutantis</i>	
Backfill Stress and Strain Information within a Centrifuge Geosynthetic-Reinforced Slope Model under Working Stress and Large Soil Strain Conditions	461
<i>Kuo-Hsin Yang, Jorge G. Zornberg, Chia-Nan Liu, Horn-Da Lin</i>	
Experimental Modeling of Rainfall and Seismic Activities As Landslide Triggers.....	471
<i>Binod Tiwari, Adam Lewis</i>	
Application of GIS Tools for Three-Dimensional Slope Stability Analysis of Pre-Existing Landslides	479
<i>Binod Tiwari, Ryan Douglas</i>	
Design of 300 m High Artificial Mountain Using Geosynthetics.....	489
<i>A. Lahoti, P. Jain, K. M. Bajoria, J. N. Mandal</i>	
Perennial Infiltration-Induced Instability of Interstate 70 Embankment West of the Eisenhower/Johnson Memorial Tunnels.....	497
<i>Alexandra Waylace, Ning Lu, Sebung Oh, David Thomas</i>	
Investigation of the Design Criteria for the Analysis of I-Wall in New Orleans, Louisiana, for Flood Side Gap Condition	507
<i>Jaideep Chatterjee, Farshad Amini</i>	
Field Monitoring of Volcanic Slope Subjected to Freezing and Thawing and Its Evaluation	516
<i>S. Kawamura, S. Miura</i>	
The Deformation Behavior of Muratli Asphalt Faced Rockfill Dam	526
<i>Y. S. Ünsever, M. Y. Özkan, S. G. Yıldız</i>	
Presentation of Critical Failure Surface of Slopes Based on the Finite Element Technique	536
<i>M. Khosravi, M. Khabbazian</i>	
Investigation of White Bluffs Landslides in Washington State	546
<i>Christopher A. Bareither, Tuncer B. Edil, Craig H. Benson</i>	
Simulation of Earthquake-Induced Slope Deformation Using SPH Method.....	556
<i>Wei Chen, Tong Qiu</i>	
New Numerical Scheme in Finite Element Method for the Effective Evaluation of the Vegetation Effects on Slope Stability Modeling.....	566
<i>R. C. Tiwari, N. P. Bhandary, R. Yatabe, D. R. Bhat</i>	
Scale Effect on Strength and Failure Modes of Open Pit Cut Slope of Wardha Valley Coalfield in India.....	576
<i>Dhananjai Verma, Deepankar Choudhury, P. G. Ranjith, T. N. Singh</i>	
Monitoring and Analysis of High Fill Embankment Settlements	586
<i>H. L. Xiao, J. Huang, L. H. Li</i>	
Emerging Trends in Ground Improvement Techniques	594
<i>B. S. Asha, B. Ram Rathan Lal, A. H. Padade, T. Mandal, J. N. Mandal</i>	
Steady State Seepage Pore Water Pressures' Influence in the Slope Stability Analysis of Levees.....	604
<i>J. F. Perri, S. E. Shewbridge, D. A. Cobos-Roa, R. K. Green</i>	
A New Approach for Pseudostatic Analysis of Critical Line Segment Slip Surface in Earth Slopes.....	614
<i>M. Hajazizi, M. Sharifipour</i>	
Investigations of Stability Improvements for Submerged Berm on Soft Clay in South Louisiana	624
<i>Wenjun Dong, Sam Yao, Andrew Hill, Neil Schwanz</i>	
Investigation of Geohazard Potential of Highway Embankment Slopes on Expansive Clay by Using Geophysical Methods.....	634
<i>J. Hossain, M. S. Hossain, N. Lozano, M. S. Khan, G. Kibria</i>	
Performance of 2V:1H Slopes with and without Soil-Nails Subjected to Seepage: Centrifuge Study	643
<i>V. M. Rotte, B. V. S. Viswanadham</i>	
Case Studies in Landslide Repair along Coastal and Riparian Areas.....	653
<i>C. E. Barrett, J. Chinchiolo</i>	
Numerical Modeling of Liquefaction-Induced Slope Movements.....	663
<i>Amalia Giannakou, Thaleia Travasarou, Jacob Chacko</i>	
Shear Strength Characterization and Back Analysis for a Landslide Complex.....	673
<i>S. Somasundaram, T. Shenthalan, T. D. Stark, T. D. Wright</i>	
A New Concept of Residual-State Creep Test to Understand the Creeping Behavior of Clayey Soils	683
<i>Deepak Raj Bhat, Netra P. Bhandary, Ryuichi Yatabe, Ram C. Tiwari</i>	

EROSION AND SCOUR

Effects of Scouring on Performance of Caisson Foundation.....	693
<i>San-Shyan Lin, S. Y. Hsu, J. C. Liao, J. G. Lin</i>	
Biological Mechanisms of Piping Erosion Reduction of Organic Soils	701
<i>Benjamin T. Adams, Ming Xiao, Alice Wright</i>	
Validation of Erosion Modeling: Physical and Numerical	710
<i>Mehrad Kamalzare, Christopher Stuetzle, Zhongxian Chen, Thomas F. Zimmie, Barbara Cutler, W. Randolph Franklin</i>	
Finite Element Analysis of Rapidly Deployable Armoring System to Mitigate Levee Erosion during Overtopping	720
<i>Amanda C. Bilberry, Isaac L. Howard, Philip M. Gullett</i>	
An Innovative Approach to Reuse and Retain Dredged Sediment for Erosion Control Using Geotextile Containers in Ecosystem Restoration	730
<i>Nageshwarreddy V. Karnati, Sachin Mandavkar, Rusty Payne</i>	
Multiscale Modeling of Flood-Induced Scour in a Particle Bed	740
<i>Y. Abdelhamid, U. El Shamy</i>	

RESEARCH ADVANCES AND CASE HISTORIES OF DEEP EXCAVATIONS

FE Simulation of Deep Excavations in Sensitive Soft Clays.....	750
<i>Ye Lu, Yong Tan, Fangle Peng, Shaoming Liao</i>	
Use of Modeling and Instrumentation during Construction of the University Link I-5 Undercrossing	760
<i>Lynn A. Salvati, Rick W. Smith</i>	

VOLUME 2

Research and Design on Top-Down Method for Large Scale Podium Basement Excavation of Shanghai Tower	770
<i>Jian Jia, XiaoLin Xie, JieQun Zhai, Yu Zhang, Ke Yang, XiaoHang Guo</i>	
Deep Portal Shafts for the Brightwater Tunnels: Geotechnical Design Considerations and Construction Experience	780
<i>U. G. Gwildis, M. A. Lach, F. Sariosseiri</i>	
Decision Process for Selection of Retaining Structure for an Excavation in Soft Clay.....	790
<i>Turan Durgunoglu, Fatih Kulac, Selim Ikiz, Ali Gunay, Onder Akcakal</i>	

SOIL PROPERTIES

BEHAVIOR AND MODELING OF SILTY SOILS

On Some of the Factors Influencing the Fines' Role on Liquefaction of Silty Sands	799
<i>M. Murat Monkul</i>	
New Density Normalization Approach for Evaluation of the Cyclic Resistance of Silts.....	809
<i>Oliver-Denzil S. Taylor, Christopher D. P. Baxter, Aaron S. Bradshaw, Alecsandra C. Morales</i>	
Residual Strength of Unsaturated Soils Using a Fully Servo/Suction-Controlled Ring Shear Apparatus.....	819
<i>L. R. Hoyos, C. L. Velosa, A. J. Puppala</i>	
Static Liquefaction and "Reverse" Behavior of Silty Sand	829
<i>Jerry A. Yamamuro, Poul V. Lade</i>	
Seismic Compression Behavior of Sands with Fines of Low Plasticity.....	839
<i>Eric Yee, Jonathan P. Stewart, Pendo M. Duku</i>	
Cyclic Instability Behaviour of Coal Ash.....	849
<i>Md. A. L. Baki, M. M. Rahman, S. R. Lo</i>	
A Rate Dependent Constitutive Model for Clay.....	859
<i>H. Martindale, T. Chakraborty, D. Basu</i>	
Characterization and Modeling of a Reconstituted Offshore Silty-Clay.....	869
<i>J. G. Tom, J. T. DeJong, R. W. Boulanger, R. A. Jaeger, N. Boylan</i>	
Collapse "Sensitivity" of Midcontinent and Lower Mississippi Valley Loess.....	880
<i>Alan J. Lutenegger</i>	

Shear Wave Velocity of Weakly Cemented Silty Sand during Drained and Undrained Triaxial Compression.....	890
<i>C. D. P. Baxter, M. S. R. Sharma</i>	
Seismic Evaluation of a Pile Foundation in Sloping Silt River Bank.....	900
<i>Patrick Wilson, Hubert Law</i>	

BEHAVIOR AND CHARACTERIZATION OF CEMENTED AND STABILIZED SOILS

Monitoring the Impact of Sulfate Attack on a Cement-Clay Mix.....	910
<i>G. Di Emidio, R. D. Verástegui Flores</i>	
Accelerated Testing of Cement Treated Singapore Marine Clay Cured under Elevated Temperature	920
<i>Y. T. Lu, T. S. Tan, K. K. Phoon</i>	
Development of a Deep Mixing Model System on Centrifuge Platform.....	930
<i>Jian Chen, Fook Hou Lee</i>	
Finite Element Analysis of Consolidation Behavior of Composite Soft Ground	940
<i>S. Horpibulsuk, A. Chinkulkijnwat, A. Cholaphatson, J. Suebsuk, M. D. Liu</i>	
Soil Stabilisation Using Sustainable Industrial By-Product Binders and Alkali Activation.....	948
<i>P. Sargent, P. N. Hughes, M. Rouainia, S. Glendinning</i>	
Measurement of Cementitious Stabilized Soil Slurry Thermal Profiles	958
<i>W. Griffin Sullivan, Tim Cost, Isaac L. Howard</i>	
Direct Shear Strength of Biologically Cemented Gravel.....	968
<i>L. A. van Paassen, W. J. van Hemert, W. R. L. van der Star, G. van Zwieten, L. van Baalen</i>	
Quantitative Models for Strength of Lime Treated Expansive Soil.....	978
<i>Amir Asad Nasrizar, K. Ilamparuthi, M. Muttharam</i>	
In Situ Test on Soft Marine Clays with High Clay Content Improved by Bidirectional Dry Jet Mixing Method.....	988
<i>Sheng-Hua Xie, Song-Yu Liu, Zhi-Bin Liu, Guang-Yin Du</i>	
Effect of Curing Time and Confining Pressure on the Mechanical Properties of Cement-Treated Sand.....	996
<i>A. T. M. Z. Rabbi, J. Kuwano</i>	
A Hollow Sphere Model to Dimension Soilcrete Columns	1006
<i>C. Arson, B. Juge</i>	
Effect of Salt Concentrations on the Electrical Resistivity of Cement-Treated Soils	1016
<i>Dingwen Zhang, Songyu Liu, Libin Fan, Yongfeng Deng</i>	
Assessment of Recycled Gypsum for Organic Soft Clay Soil Improvement	1026
<i>Aly Ahmed, Keizo Ugai, Takeshi Kamei</i>	
Numerical Modeling of the Impact of Deteriorating Treated Subgrade Modulus Due to Seasonal Changes on Pavement Performance.....	1036
<i>Bhaskar C. S. Chittoori, Anand J. Puppala, Thornchaya Wejringsikul, Laureano R. Hoyos, Minh Le</i>	

ANISOTROPY AND SHEAR BANDING IN SOILS

Global and Local Mechanical-Fabric Measurements in Granular Assemblies Using DEM	1046
<i>Pengcheng Fu, Yannis F. Dafalias</i>	
Inherent Anisotropy in Pavement Subgrades.....	1056
<i>Lucas de Melo, Bartolomeu P. Cabral</i>	
Upper Bound Solutions for Bearing Capacity of Footings on Anisotropic Cohesive Soils	1066
<i>Mosleh Ali Al-Shamrani, Arif Ali Baig Moghal</i>	
Simulations of 3-D Drained Behavior of Normally Consolidated Clay Using Elastoplastic Models.....	1076
<i>Pongpipat Anantanasakul, Victor N. Kaliakin</i>	
Cross-Anisotropy in Fiber-Reinforced Sand	1086
<i>Radoslav L. Michalowski</i>	
Shear Banding in Clay under Axisymmetric Triaxial Stress Conditions	1096
<i>J. A. Yamamoto, Y. Liu</i>	
Analysis of a Field Experiment to Assess the Performance of an Anisotropic Plasticity Model for Cohesive Soils	1106
<i>Majid T. Manzari, Karma Yonten</i>	
Selected Observations from 3-D Experimental and Numerical Studies of Shear Banding in Biaxial Shear Tests	1116
<i>J. D. Frost, T. M. Evans, Y. Lu, X. Zhao</i>	

ADVANCES IN CLAY MINERALOGY

Influence of Mineral Montmorillonite on Soil Suction Modeling Parameters.....	1126
<i>Aravind Pedarla, Anand J. Puppala, Bhaskar S. Chittoori, Laureano R. Hoyos, Claudia Zapata, Sandra L. Houston</i>	
Characterization of Adsorbed Polymer Conformational Response Using Spectroscopic Ellipsometry.....	1136
<i>Sungho Kim, Angelica M. Palomino, Nikolas J. Podraza</i>	
Chemical and Mineralogical Behaviour of Lignosulfonate Treated Soils.....	1146
<i>Buddhima Indraratna, M. A. A. Mahamud, J. S. Vinod</i>	
The Influence of Clod Size and Moisture Condition on the Shearing Behavior of Compacted Lean Clay	1156
<i>Wassim E. Tabet, Amy B. Cerato, Gerald A. Miller</i>	
Characterization of Clays Using Quantitative XRD and Chemical Analyses.....	1165
<i>Maria Chrysochoou, Anand Puppala, Bhaskar Chittoori</i>	
Characterizing Physical Properties of Clay by Water Vapor Sorption	1175
<i>W. J. Likos, N. Lu</i>	
Effect of Mineral Composition and Shearing Rates on the Undrained Shear Strength of Expansive Clays	1185
<i>Beena Ajmera, Binod Tiwari, Dinesh Shrestha</i>	
Time Dependent Rheological Behavior of Modified Bentonite Suspensions.....	1195
<i>J. S. Yoon, C. S. El Mohtar</i>	
Hysteretic Water Retention Behavior of Two Highly Clayey Expansive Soils	1205
<i>B. Lin, A. B. Cerato</i>	
Evaluation of Organically Modified Clays for Geoenvironmental Applications.....	1213
<i>Vandana Sreedharan, P. V. Sivapullaiah</i>	
Consolidation Characteristics of Soft Clays with Saline Water As a Pore Fluid.....	1223
<i>Beena Ajmera, Binod Tiwari</i>	
Appraisal of the Irreversible Effect of Organic Compounds on Geotechnical Properties of Clays.....	1233
<i>Oksana Paykov, Binod Tiwari, Adrian Correa, Silman Ruiz</i>	
Micro-Analysis in Glass Beads with Environmental Scanning Electron Microscopy.....	1243
<i>Hengzhen Lee, Liming Hu</i>	

GEOTECHNICAL ENGINEERING EDUCATION

The Adjunct Professor's Role in Geotechnical Engineering Education: A Bridge between the Classroom and the Workplace.....	1253
<i>Waddah Akili</i>	
A Review of Shear Stress Sign Convention in Interpreting Mohr's Circle Using the Pole of Planes Method.....	1263
<i>Scott M. Merry, Evert C. Lawton</i>	
Undergraduate Geotechnical Lesson Modules Based on New Orleans Levee Failures	1273
<i>Anirban De</i>	
Service-Learning Design Projects to Enhance Geotechnical Engineering Education.....	1283
<i>Mandar M. Dewoolkar, John E. Lens, Nancy J. Hayden</i>	
Geotechnical Engineering Education in the IT Era	1293
<i>Sukhmander Singh</i>	

PAVEMENTS

GEOSYNTHETICS IN ROADWAY CONSTRUCTION: PERFORMANCE SPECIFICATIONS AND EVALUATION

The Use of Vertical Columns in Combination with Geocell Stabilized Load Transfer Platforms for the Construction of Roadways over Soft Soils.....	1302
<i>A. Emersleben, N. Meyer</i>	
Monitoring Performance of Geosynthetic-Reinforced and Lime-Treated Low-Volume Roads under Traffic Loading and Environmental Conditions.....	1310
<i>J. G. Zornberg, G. H. Roodi, J. Ferreira, R. Gupta</i>	
Relevancy of Material Properties in Predicting the Performance of Geogrid-Stabilized Roadways.....	1320
<i>S. Archer, M. H. Wayne</i>	

Effect of Geosynthetic Reinforcement Creep on the Long Term Performance of an Embankment	1330
<i>M. R. Karim, C. T. Gnanendran, S.-C. R. Lo</i>	
Studies on the Performance of Geogrid Reinforced Soil Walls with Compressible Inclusion.....	1340
<i>A. S. Mane, B. V. S. Viswanadham</i>	
Assessment of QC/QA Technologies for Evaluating Properties and Performance of Geosynthetics in Roadway Systems	1350
<i>Jie Han, Jitendra K. Thakur, Ryan Corey, Barry R. Christopher, Deep Khatri, Bhagaban Acharya</i>	
Pullout Performance of Geogrids with Different Junction Strength.....	1360
<i>T. Mahmood, K. Hatami, R. Ghabchi, M. M. Zaman</i>	

FIELD ESTIMATION OF STIFFNESS OF SUBGRADES AND UNBOUND LAYERS

A Best-Fit Rigid Pavement Back-Calculation Algorithm Using Site-Specific Deflections.....	1371
<i>A. T. Papagiannakis, J. F. Merchant</i>	
Laboratory and Field Measured Moduli of Unsurfaced Pavements on Weak Subgrade	1381
<i>Debakanta Mishra, Erol Tutumluer, Maziar Moaveni, Yuanjie Xiao</i>	
Performance Verification of a Geogrid Mechanically Stabilized Layer Flexible Pavement Design As Part of the La Media Road Widening Project.....	1391
<i>L. Nelson, G. B. Fountain, M. H. Wayne</i>	
Forward Calculation of Subgrade Modulus Using Falling Weight Deflectometer Time Histories and Wave Propagation Theory	1400
<i>K. Chatti, L. Lei</i>	
Properties of Subgrade and Construction Techniques of Mobei Expressway.....	1410
<i>Wenbing Yu, Fuqiang Che, Wenjie Feng, Ming Guo, Gangyi Zhou</i>	

GEOTECHNICAL INPUTS TO MECHANISTIC-EMPIRICAL PAVEMENT DESIGN

Influence of Fines Content on Unbound Granular Base Materials (UGB) under Cyclic Axial and Radial Stress.....	1418
<i>M. Ohiduzzaman, S. C. R. Lo, O. Craciun</i>	
Resilient Moduli Behavior of Lime-Cement Treated Subgrade Soils.....	1428
<i>Ranjan K. Rout, Pinit Ruttanapormakul, Shashank Valluru, Anand J. Puppala</i>	
Evaluation of the MEPDG Permanent Deformation Models in Louisiana Conditions	1438
<i>Zhong Wu, Xiaoming Yang</i>	
Effects of Subgrade Resilient Modulus and Climate Inputs on MEPDG.....	1448
<i>Xiaoming Yang, Zhong Wu</i>	
Incorporating Stochastic Evaluation in the Estimation of Soil Resilient Modulus	1458
<i>Daniel C. Rosenbalm, Claudia E. Zapata</i>	
Structural Contribution of Geogrid Reinforcement in Pavement	1468
<i>Qiming Chen, Murad Abu-Farsakh</i>	
Hydraulic Properties of Recycled Asphalt Pavement and Recycled Concrete Aggregate	1476
<i>Kongrat Nokkaew, James M. Tinjum, Craig H. Benson</i>	
Effect of Compaction Method on Mechanical Behavior of Graded Aggregate Base Materials	1486
<i>Zulkuf Kaya, Altan Cetin, Bora Cetin, Ahmet H. Aydilek</i>	
Local Sensitivity of Mechanistic-Empirical Flexible Pavement Performance Predictions to Unbound Material Property Inputs	1495
<i>Rui Li, Charles W. Schwartz, Sungewan Kim, Halil Ceylan</i>	
Impact of Bio-Fuel Co-Product Modified Subgrade on Flexible Pavement Performance.....	1505
<i>Sungewan Kim, Kashthirirangan Gopalakrishnan, Halil Ceylan</i>	
Strength Behaviour of Reinforced Soil-Aggregate Systems under Repeated and Cyclic Loading	1513
<i>M. N. Asha, G. Madhavi Latha</i>	
Assessment of Influence of Soil Properties on Subgrade Stiffness Using the Long Term Pavement Performance Data.....	1523
<i>Yong An Lee, Moonkyung Chung</i>	

VOLUME 3

SUSTAINABLE PAVEMENTS

Recycled Clay Masonry and Recycled Concrete Aggregate Blends in Pavement	1532
<i>D. A. Cameron, A. H. Azam, M. M. Rahman</i>	
Applicability of Coal Ashes to Be Used for Stabilized Pavements Base	1542
<i>L. S. E. Lopes, L. Sziliga, M. D. T. Casagrande, L. M. G. Motta</i>	
Kansas Experience with Stiffness-Based Quality Control/Quality Assurance Specifications for Compaction of Highway Embankments	1552
<i>F. Rahman, M. Hossain, S. A. Romanoschi, J. Brennan</i>	
A Large Test Box Study on Geocell-Reinforced Recycled Asphalt Pavement (RAP) Bases over Weak Subgrade under Cyclic Loading.....	1562
<i>Jitendra K. Thakur, Jie Han, Sanat K. Pokharel, Robert L. Parsons</i>	
Spectroscopic Evaluation of Recycled Asphalt Pavement Materials.....	1572
<i>A. Zofka, M. Chrysochoou, I. Yut</i>	
Laboratory Performance Characterization of Pavements Incorporating Recycled Materials	1582
<i>R. Ashtiani, A. Saeed</i>	
Laboratory Evaluation of Foamed Asphalt Stabilized Base Materials	1592
<i>Sadaf Khosravifar, Dimitrios G. Goulias, Charles W. Schwartz</i>	
Investigation of Foamed Warm Mix Asphalt Performance Using the MEPDG.....	1602
<i>Munir Nazzal, Ala R. Abbas, Ayman W. Ali, Arjun Roy</i>	
Evaluation of Recycled Asphalt Pavement Materials from Ultra-Thin Bonded Bituminous Surface	1612
<i>F. Rahaman, H. Y. Musty, M. Hossain</i>	
Performance Improvement of Railway Ballast Using Shock Mats and Synthetic Grids	1622
<i>Sanjay Nimbalkar, Buddhima Indraratna, Cholachat Rujikiatkamjorn</i>	
Evaluation of Superpave Mixtures with High RAP Content	1632
<i>Farhana Rahman, Mustaque Hossain, Cliff Hobson, Greg Schieber</i>	
The Use of Recycled Glass for the Construction of Pavements.....	1642
<i>A. Emersleben, N. Meyer</i>	

GEOTECHNICAL EARTHQUAKE ENGINEERING

ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING

Estimation of Probabilistic Seismic Hazard and Site Specific Ground Motions for Two Ports in Gujarat	1650
<i>Jaykumar Shukla, Deepankar Choudhury</i>	
Numerical Insights into Liquefaction-Induced Building Settlement	1660
<i>S. Dashti, J. D. Bray</i>	
Liquefaction of Dense Sand under Earthquake Loading	1670
<i>X. Zeng, G. Liu</i>	
A Framework for Performance-Based Earthquake Engineering of Bridge-Abutment Systems	1680
<i>Jinchu Lu, Kevin Mackie, Ahmed Elgamal, Anoosh Shamsabadi</i>	
Design of Extended Pile Shafts for Liquefaction Effects	1690
<i>A. Khosravifar, R. W. Boulanger</i>	
Geotechnical Aspects of the Mw 6.2 2011 Christchurch, New Zealand, Earthquake	1700
<i>R. A. Green, M. Cubrinovski, L. Wotherspoon, J. Allen, B. Bradley, A. Bradshaw, J. Bray, G. DePascale, R. Orense, T. O'Rourke, M. Pender, G. Rix, D. Wells, C. Wood, D. Henderson, L. Hogan, P. Kailey, K. Robinson, M. Taylor, A. Winkley</i>	
SASSI Analytical Methods Compared with SHAKE Results	1710
<i>L. M. Anderson, S. A. Carey, J. Amin</i>	
Development of Seismic Design Approach for Freestanding Freight Railroad Embankment Comprised of Lightweight Cellular Concrete	1720
<i>J. Anderson, S. Bartlett, N. Dickerson, P. Poepzel</i>	
DEM Simulations of the Seismic Response of Soil-Foundation-Structure Systems	1730
<i>U. El Shamy, N. Zamani</i>	
Measurement of Residual Strength of Liquefied Soil in Centrifuge Models	1740
<i>Ian Anderson, Jay Hargy, Pedro de Alba, Mandar Dewoolkar</i>	

Effects of Ground Motion Characteristics on Seismic Response of Rocking-Foundation Bridges	1750
<i>Lijun Deng, Bruce L. Kutter, Sashi K. Kunmath</i>	
Centrifuge Testing of Rocking Foundations on Saturated Sand and Unconnected Piles: The Fluid Response	1760
<i>Jacquelyn Allmond, Bruce L. Kutter</i>	
A Comparison of SPT-Based Empirical Liquefaction Triggering Procedures for Soils at Significant Depths (+20 m).....	1770
<i>S. C. Griffiths, B. R. Cox</i>	
Evaluation of p-y Curves Used in Practice for Seismic Analysis of Soil-Pile Interaction	1780
<i>Amin Rahmani, Mahdi Taiebat, W. D. Liam Finn, Carlos E. Ventura</i>	
Site Response Analysis in Transportation Engineering Practice—A TRB Survey	1789
<i>N. Matasovic, Y. M. A. Hashash</i>	
Site Response Analysis of Liquefying Sites.....	1799
<i>K. Ziotospoulou, R. W. Boulanger, S. L. Kramer</i>	
Seismic Interference Effect of Two Nearby Horizontal Strip Anchors	1809
<i>Rajusha Kumari, Priyanka Ghosh</i>	
Three-Dimensional Analysis of Underground Tunnels in Liquefiable Soil Subject to Earthquake Loading	1819
<i>H. Liu</i>	
Assessment of Liquefaction Potential of Pond Ash at Panipat in India Using SHAKE2000	1829
<i>Supriya Mohanty, Nihar Ranjan Patra</i>	
Seismic Response of CDSM Improved Soft Clay Sites Supporting Single Piles	1839
<i>Amirata Taghavi, Kanthasamy K. Muraleetharan</i>	
Constructive and Destructive Footing-Soil-Footing Interaction for Vertically Vibrating Footings	1849
<i>H. Puangnak, B. Choy, H. B. Mason, B. L. Kutter, J. Bray</i>	
Assessment of Liquefaction Potential of Alluvial Soil of Indo-Gangetic Interfluves, Northern India	1859
<i>S. P. Naik, N. R. Patra, J. N. Malik</i>	
Local Site Effects on Seismic Ground Response of Dubai-Sharjah Metropolitan Area	1869
<i>Muhammad Irfan, Magdi El-Emam, Zahid Khan, Jamal Abdalla</i>	
Seismic Performances of Slurry Walls.....	1879
<i>Mathew D. Graham, Ming Xiao, Louay M. Owaidat</i>	
Site Specific Ground Response Study of Deep Indo-Gangetic Basin Using Representative Regional Ground Motions.....	1888
<i>Abhishek Kumar, P. Anbazhagan, T. G. Sitharam</i>	

SOIL IMPROVEMENT SOLUTIONS FOR SEISMIC HAZARDS

Seismic Cone Penetration Test Assessment of Vibratory Probe Compaction for Liquefaction Mitigation	1898
<i>Yuan Cheng, Songyu Liu, Zhibin Liu, Guojun Cai</i>	
Effect of Discrete Columns on Shear Stress Distribution in Liquefiable Soil	1908
<i>D. Rayamajhi, T. V. Nguyen, S. A. Ashford, R. W. Boulanger, J. Lu, A. Elgamal, L. Shao</i>	
Liquefaction Mitigation Using Microbial Induced Calcite Precipitation	1918
<i>B. M. Montoya, J. T. DeJong, Ross W. Boulanger, Dan W. Wilson, Ray Gerhard, Anatoliy Ganchenko, Jui-Ching Chou</i>	
High Vacuum Densification Method for Soft Soil Improvement.....	1928
<i>R. Y. Liang, S. L. Xu</i>	
Influencing Factors on the Dynamic Properties of Organobentonites	1938
<i>Bate Bate, Susan Burns</i>	
Effect of DSM Grids on Shear Stress Distribution in Liquefiable Soil	1948
<i>T. V. Nguyen, D. Rayamajhi, R. W. Boulanger, S. A. Ashford, J. Lu, A. Elgamal, L. Shao</i>	
Numerical Study of the Effectiveness of Bentonite Treatment for Liquefaction Mitigation	1958
<i>A. F. Witthoeft, M. C. Santagata, A. Bobet</i>	

ROLES AND INFLUENCES OF PHYSICAL MODELING ON STATE OF THE ART AND PRACTICE OF GEOTECHNICAL EARTHQUAKE ENGINEERING

Centrifuge Evaluation of the Impact of Partial Saturation on the Amplification of Peak Ground Acceleration in Soil Layers	1968
<i>M. Ghayoomi, J. S. McCartney</i>	

Centrifuge Modeling of Unsaturated Soil-Pile System	1978
<i>N. Ravichandran, S. H. Krishnapillai, B. Machmer</i>	
Boundary Conditions in Physical Model Tests—The Influence of Deck Pinning on the Response of Piled Bridge Abutments in Laterally Spreading Soils	1988
<i>J. J. M. Haskell, S. P. G. Madabhushi, M. Cubrinovski</i>	
Centrifuge Study of the Effect of Permeability and Other Soil Properties on the Liquefaction and Lateral Spreading of Dense Sand	1998
<i>Hesham El Ganainy, Tarek Abdoun, Ricardo Dobry</i>	
Dynamic Centrifuge Simulation for Soil-Foundation-NPP Containment System.....	2008
<i>Jeong-Gon Ha, Sei-Hyun Lee, Se-Hee Kim, Dong-Soo Kim</i>	
Influence of Physical Modeling on Adoption of Rocking Foundations in Practice	2017
<i>Bruce L. Kutter, Tara C. Hutchinson, Mark A. Moore, Sashi Kunath, Lijun Deng</i>	
Centrifuge Tests for Artificially Cemented Clay Slopes.....	2027
<i>D. S. Park, B. L. Kutter</i>	
Soil Characterization in Centrifuge Models through Measurement of Shear Wave Velocities Using Bender Elements	2037
<i>Waleed El-Sekelly, Tarek Abdoun, Ricardo Dobry</i>	
Comparison of Lateral Pile Behavior under Static and Dynamic Loading by Centrifuge Tests	2048
<i>M. T. Yoo, J. T. Han, J. I. Choi, I. W. Jung, M. M. Kim</i>	

SEISMIC DESIGN OF RETAINING STRUCTURES

Comparison of Seismic Design Methods for an Open-Bottom Box Culvert	2058
<i>Mark J. Thompson, Seungcheol Shin, Donald G. Anderson</i>	
Reduction of Lateral Earth Forces on Yielding Flexible Retaining Walls by EPS Geofoam Inclusions	2068
<i>Ozgur L. Ertugrul, Aurelian C. Trandafir</i>	
Scale Model Shake Table Testing of Seismic Earth Pressures in Soft Clay	2078
<i>Robb Eric S. Moss, Ron E. Noche</i>	
Experimental Assessment of the Passive Resistance of a Bridge Abutment System with Various Backfill Heights.....	2088
<i>Anne Lemnitzer, Chris Hilson, Ali Nojoumi, Ertugrul Taciroglu, John W. Wallace, Jonathan P. Stewart</i>	

NUMERICAL MODELING OF LIQUEFACTION IN DAMS AND LEVEES

Analysis of Submarine Flow Slides in Fine Silty Sand.....	2098
<i>Poul V. Lade, Jerry A. Yamamuro</i>	
Effect of Ground Motion Characteristics on Liquefaction Modeling of Dams.....	2108
<i>M. H. Beaty, V. G. Perlea</i>	
Updates to a Practice-Oriented Liquefaction Model	2118
<i>E. M. Dawson, L. H. Mejia</i>	

ANALYTICAL, NUMERICAL, AND PHYSICAL MODELING

LABORATORY AND PHYSICAL MODELING FOR USE IN NUMERICAL ANALYSIS

Studying Buried Pipeline Behavior Using Physical and Numerical Modeling	2128
<i>Ömer Bilgin, Harry E. Stewart</i>	
Interaction between Electromagnetic Waves and Transport in Saturated Media	2138
<i>Mahsa Azad, Harlan D. O. Sangrey, Arvin Farid, Jim Browning, Elisa Barney Smith</i>	
A Refined Approach to Barcelona Basic Model: Experimental Evidence and Parametric Performance	2148
<i>L. R. Hoyos, D. D. Pérez-Ruiz</i>	
Field-Measured Response of an Integral Abutment Bridge.....	2157
<i>Karrthik Kirupakaran, Bryce Hanlon, Kanthasamy K. Muraleetharan, Gerald A. Miller</i>	
Simulating the Viscous Behavior of Sandy Ground by FEM	2167
<i>Fang-Le Peng, Ke Tan, Yong Tan</i>	
Numerical Simulation of Direct Shear Test on Rock Joint	2177
<i>A. K. Shrivastava, K. S. Rao, Ganesh W. Rathod</i>	
Parametric Identification of Dynamic Granular Soil Properties by Ambient Vibration	2187
<i>Mahdi Soudkhah, Ronald Y. S. Pak</i>	

Mechanical Behavior of Granular Materials Considering Confining Pressure Dependency	2197
<i>Md. Abu Sayeed, Md. Mahmud Sazzad, Kiichi Suzuki</i>	
Comparing Frequency and Time Domain Interpretations of Bender Element Shear Wave Velocities	2207
<i>M. A. Styler, J. A. Howie</i>	
Numerical Simulation of Smear Effect on Radial Consolidation	2217
<i>Daping Xiao, Hong Yang</i>	
Single Degree of Freedom Modeling and Testing of a Pile under Lateral Impact Load	2227
<i>Alireza Mirdamadi, Seok-Gyu Lim, Jean-Louis Briaud, Jose Roessel, Dean Alberson</i>	
Non-Linear Small Strain Stiffness of Glacial Till	2234
<i>David Simpson, Mohamed Rouainia</i>	
Injection Experiments in Sand and Silica Flour Mixtures	2244
<i>P. Callahan, F. Zhang, A. Martell, A. Horner, H. Huang</i>	
Effectiveness of Preloading on the Time Dependent Settlement Behaviour of an Embankment	2253
<i>M. N. Islam, C. T. Gnanendran, S. T. Sivakumar</i>	
3D Numerical Modeling of Hexagonal Wire Mesh Reinforced Embankment on Soft Bangkok Clay	2263
<i>Cholachat Rujikiatkamjorn, Buddhima Indraratna, Dennes T. Bergado</i>	
Seismic Analysis of Pile Group in Soil Slopes Using Pseudostatic Approach	2273
<i>H. Elahi, H. G. Poulos, M. Moradi, A. Ghalandarzadeh</i>	
Temperature Dependent Dynamic Properties of Oily Clay	2283
<i>C. I. Medina, M. Pervizpour, S. Pamukcu, M. A. Mentzer</i>	

VOLUME 4

Local Deformation Analysis of a Sand Specimen Using 3D Digital Image Correlation for the Calibration of a Simple Elasto-Plastic Model	2292
<i>Ahram Song, Zenon Medina-Cetina, Amy L. Rechenmacher</i>	

ANALYTICAL AND NUMERICAL METHODS IN DISCONTINUOUS MEDIA

Mathematical Modeling of Electrically Assisted Hydrocarbon Transport in Porous Media	2302
<i>Ehsan Ghazanfari, Mesut Pervizpour, Sibel Pamukcu</i>	
Physical Modeling of Soil-Infilled Discontinuities	2312
<i>Buddhima Indraratna, Wuditha N. Premadasa, David Oliveira</i>	
Global Continuous-Local Discontinuous Approach for the Analysis of Shallow Underground Caverns in Soft and Discontinuous Rock	2322
<i>M. Tsesarsky, E. Gal, E. Machlav</i>	
Thermo-Mechanical Damage in Porous Rocks: Theoretical Framework and Modeling Considerations	2332
<i>Hao Xu, Chloé Arson</i>	
Pore Directivity of Soils Subjected to Shearing: Numerical Simulation and Image Processing	2342
<i>Dong Hun Kang, Jung Hwoon Lee, Jinyun Choo, Tae Sup Yun</i>	
Finite Element Computations of Yield Vertex Non-Coaxial Models	2352
<i>Yuning Yang, Hai-Sui Yu</i>	
Electrical Conduction of Granular Media: Experimental and Numerical Studies	2362
<i>Junghwoon Lee, Tae Sup Yun</i>	
Fracture Cluster Modeling for Groundwater Inflow Prediction into Rock Tunnels Using Geostatistics	2372
<i>Ran Chen, Fluvio Tonon</i>	
3 Dimensional Stability Assessment of Jointed Rock Slopes Using Distinct Element Modelling	2382
<i>Ganesh W. Rathod, Alex Varughese, A. K. Srivastava, K. S. Rao</i>	
Macro- and Micro-Scale Effects of Pluviation Based Sample Preparation in DEM	2392
<i>M. L. Bernhardt, C. O'Sullivan, G. Biscontin</i>	

ROLES AND INFLUENCES OF PHYSICAL MODELING ON THE STATE OF THE ART AND PRACTICE OF GEOTECHNICAL ENGINEERING

Centrifuge Modeling to Support the Design of Subsea Pipelines	2402
<i>C. Gaudin, D. J. White</i>	
Measured versus Predicted Side Resistance of Drilled Shafts in a Heterogeneous Soil Profile	2412
<i>Scott M. Mackiewicz, Jonathan Lehman-Svoboda</i>	

Undrained Shear Strength of Normally Consolidated Clays with Different Plastic Properties.....	2422
<i>Chung-Ching Hsieh, I-Hsuan Ho</i>	

UNSATURATED SOILS

ADVANCES IN COMPUTATIONAL MODELING OF UNSATURATED SOILS

Numerical Study on Effects of Initial State on Liquefaction of Unsaturated Soils.....	2432
<i>Chunyang Liu, Kanthasamy K. Muraleetharan</i>	
Modeling Unsaturated Soil Behaviour in Stress-Saturation Space	2442
<i>Daichao Sheng, An-Nan Zhou</i>	
Behavior of Swelling Clays: A Molecular Dynamic Study	2452
<i>Priyanthi M. Amarasinghe, A. Anandarajah</i>	
Dynamic Analysis of Unsaturated Soil-Pile System Using Simplified Finite Element Formulation	2462
<i>N. Ravichandran, A. Bhuiyan, E. L. Huggins</i>	
A General Fully Coupled Elasto-Plastic Constitutive Model for Unsaturated Soils	2472
<i>M. Lloret, M. Sánchez, S. J. Wheeler</i>	
Behavior of Swelling Clays: A Discrete Element Study.....	2482
<i>A. Anandarajah, Priyanthi M. Amarasinghe</i>	
Mechanical Modeling of Frozen Soils Incorporating the Effect of Cryogenic Suction and Temperature	2492
<i>Ajay Shastri, Marcelo Sanchez</i>	

SOLVING GEOTECHNICAL PROBLEMS USING THE MECHANICS OF UNSATURATED SOILS

Stability Analysis of Unsupported Vertical Trenches in Unsaturated Soils.....	2502
<i>S. K. Vanapalli, W. T. Oh</i>	
Experimental and Numerical Analysis of an Unsaturated Volcanic Ash Deposit for the Establishment of an Early Warning System in a Quarry in Costa Rica	2512
<i>A. Ferrari, J. Eichenberger, J. Fern, P. Ebeling, L. Laloui</i>	
Thermal and Electrical Properties of Water-Repellent Sands.....	2522
<i>Daehyun Kim, Taesup Yun</i>	
Shear Strength Behavior of Highly Expansive Soil.....	2532
<i>T. Y. Elkady, M. F. Abbas</i>	
Modelling the Settlement Behaviour of In Situ Shallow Foundations in Unsaturated Sands	2542
<i>W. T. Oh, S. K. Vanapalli</i>	
Settlement Estimation of Shallow Footings of Saturated and Unsaturated Sands	2552
<i>F. M. O. Mohamed, S. K. Vanapalli, M. Saatcioglu</i>	

IN SITU TESTING IN UNSATURATED SOILS

Interpretation of Borehole Shear Strength Tests of Unsaturated Loess by Suction Stress Characteristic Curves.....	2562
<i>Jeremy C. Ashlock, Ning Lu</i>	
Influence of Matric Suction on Pressuremeter Modulus.....	2572
<i>G. A. Miller, N. K. Tan, K. K. Muraleetharan</i>	

SITE CHARACTERIZATION, IN SITU TESTING, AND MONITORING

ADVANCES OF IN SITU TESTING TECHNOLOGIES IN GEOTECHNICAL ENGINEERING: INTERPRETATIONS, ANALYSIS, DESIGN, AND MONITORING

Behavior of a Trial Embankment with Reinforced Steep Slope and Mechanically Stabilized Earth Wall II: Field Monitoring.....	2580
<i>M. Dechasakulsom, J. Sukolrat, A. Sawangsuriya</i>	
Investigation of In Situ Soil Density Change by Resistivity Measurements.....	2590
<i>A. Beijer Lundberg, J. Dijkstra, F. van Tol, W. Broere</i>	
True Three-Dimensional Soil Classification Based on CPTu Data.....	2599
<i>T. Liao, P. W. Mayne</i>	

Elastic Cross-Anisotropy of Chicago Glacial Clays from Field and Laboratory Data	2609
<i>R. J. Finno, D. R. Hiltunen, T. Kim</i>	
Numerical Study of Rock Identification Number β in Pressuremeter Test	2619
<i>A. A. Sharo, R. Y. Liang</i>	
Investigation of Moisture Variation of Backfill Soil in MSE Wall	2629
<i>G. Kibria, M. S. Hossain, J. Hossain, M. S. Khan</i>	
Feasibility and Sensitivity Analysis of At-Rest Lateral Stress Coefficient (K_0) Evaluations Using Paired Shear Wave Velocity Modes	2639
<i>Taeseo Ku, Paul W. Mayne</i>	
Measurement of Thermal Properties of Soils by Thermal Pulse Technology	2649
<i>Bin Zhang, Xiong Yu</i>	
Experimental Studies on Hydraulic Barrier Performance and Quality Control of SBM Cut-Off Wall: Applicability of Piezocene Test.....	2659
<i>Atsushi Takai, Toru Inui, Takeshi Katsumi, Masashi Kamon, Susumu Araki</i>	
Measured Drill Hole Verticality	2669
<i>J. R. Davie, T. Liao, K. R. Bell, D. E. Gerken</i>	
Study on Soil Type Effects on Micropile Behavior Using Full Scale Loading Tests	2678
<i>Mohsen Sabermahani, Mohammad Nasr, Hamidreza Elahi</i>	
System-Equivalent-Mass Based Post-Tensioned Anchor Tension Testing Technique	2688
<i>Jiaye Wu, Jiaer (Jerry) Wu, Chao Yang, Wen-Hong Ji, Yun-Long Mao, Ronglu Wang</i>	
Comparative Study of Shear Modulus in Calcareous Sand and Sabkha Soils	2697
<i>Khaled H. Charif, Shadi Najjar</i>	
Laboratory Evaluation of the Soil Density Gauge (SDG).....	2707
<i>A. Sawangsuriya, C. Ketkaew, W. Sramoon</i>	

SHEAR WAVE VELOCITY MEASUREMENTS USING SURFACE WAVE METHODS

Application of a Simplified Inversion Technique to Published Surface Wave Dispersion Data— Comparisons with Advanced Methods of Inversion	2716
<i>P. C. Pelekis, G. A. Athanasopoulos</i>	
A Comparison of SASW Survey Results with In Situ Field Investigation Methods.....	2726
<i>Marshall Lew, Kenneth H. Stokoe II, Craig A. Davis, Hari Ponnaboyina, Martin B. Hudson, David L. Perry</i>	
Inversion Uncertainty in Surface Wave Analysis.....	2736
<i>C. Comina, S. Foti, L. V. Socco</i>	
Earthquake Hazard Class Mapping by Parcel in Las Vegas Valley.....	2746
<i>J. N. Louie, S. K. Pullammanappallil, A. Pancha, W. K. Hellmer</i>	
A Comparison of MASW Dispersion Uncertainty and Bias for Impact and Harmonic Sources	2756
<i>C. M. Wood, B. R. Cox</i>	
Shear Wave Velocity via Inversion of Full Waveforms	2766
<i>Khiem T. Tran, Dennis R. Hiltunen</i>	
Analysis of Surface-Wave Data Including Higher Modes Using the Genetic Algorithm.....	2776
<i>K. Hayashi</i>	
Observations from the Implementation of a Combined Active and Passive Surface Wave Based Methodology.....	2786
<i>A. Sahadewa, D. Zekkos, R. D. Woods</i>	
Two-Dimensional Seismic Wave Modeling and Inversion by the Boundary Element Method	2796
<i>Samuel Bignardi, Francesco Fedele, Anthony Yezzi, Glenn Rix, Giovanni Santarato</i>	

IMPACT OF SPATIAL VARIABILITY IN ANALYSIS AND DESIGN

Response of Strip Foundation on Spatially Random Elastic Foundation under Variable Column Loads.....	2806
<i>Sumanta Haldar, Dipanjan Basu</i>	
Soil Characterisation of an Artificial Island Accounting for Heterogeneity.....	2816
<i>M. Lloret, M. A. Hicks, S. Y. Wong</i>	
Improved Subset Simulation for the SLS Analysis of Two Neighboring Strip Footings Resting on a Spatially Random Soil	2826
<i>Ashraf Ahmed, Abdul-Hamid Soubra</i>	
Reliability Based Design on Long Irrigation Channel Considering the Soil Investigation Locations	2836
<i>Y. Otake, Y. Honjo</i>	

Settlement of Piles Founded in Spatially Variable Soils	2846
<i>Farzaneh Naghibi, Gordon A. Fenton, D. V. Griffiths, Richard J. Bathurst</i>	
Effect of Uncertain Spatial Variability of Soils on Nonlinear Seismic Site Response Analysis	2856
<i>Kallol Sett, Kow Eshun, You Chen Chao, Boris Jeremic</i>	
Probabilistic Model for Overall Shear Strengths of Spatially Variable Soil Masses.....	2866
<i>Jianye Ching, Kok-Kwang Phoon</i>	
Effect of Spatial Variability on Probability-Based Design of Excavations against Basal-Heave	2876
<i>Zhe Luo, Sez Atamturktur, C. Hsein Juang</i>	
Event Tree and Fault Tree Analysis in Tunneling with Imprecise Probabilities	2885
<i>Xiaomin You, Fluvio Tonon</i>	
Evaluation of Soil Variability Influence on Deep Excavation Analysis—Simplified Approach.....	2895
<i>Huu-Phuoc Dang, Horn-Da Lin, C. Hsein Juang</i>	
Development of Geospatial Analysis Method to Detect Outlying Data Points.....	2904
<i>Hyun-Ki Kim, Han-Saem Kim, Si-Yeol Shin, Choong-Ki Chung</i>	
An Investigation of Three Probabilistic Approaches for Levee Underseepage Analysis	2912
<i>Sittinan Benjasupattananan, Christopher L. Meehan</i>	
Impact of Spatial Variability on the Design of Drilled Shafts in Weak Carbonate Rocks	2922
<i>Shadi Najjar, Khaled H. Charif, S. Sadek</i>	
Influence of Soil Spatial Variability and Stochastic Ground-Motion on the Dynamic Behavior of a Slope.....	2932
<i>Tamara Al-Bittar, Dalia Youssef Abdel Massih, Abdul Hamid Soubra, Fadi Hage Chehade</i>	
Impact of Variability in Soil Parameter on Culvert Load Rating	2942
<i>Priyantha W. Jayawickrama, Asitha Senanayake, William D. Lawson, Timothy A. Wood</i>	
Examination of Multivariate Dependency Structure in Soil Parameters.....	2952
<i>Kok-Kwang Phoon, Jianye Ching, Hongwei Huang</i>	
Effect of Distance and Direction on Ground Surface Vibrations Generated by Array Blasting: A Numerical Study	2961
<i>M. E. Kalinski</i>	
Evaluation of Bearing Capacity of Shallow Foundations Using Random Field Theory in Comparison to Classic Methods	2971
<i>Negin Zhalehjoo, Reza Jamshidi Chenari, Kaveh Ranjbar Pouya</i>	

ADVANCES IN REMOTE SENSING IN GEOTECHNICAL ENGINEERING

Ultra-High Resolution Four Dimensional Geodetic Imaging of Engineered Structures for Stability Assessment.....	2981
<i>G. W. Bawden, S. Bond, J. H. Podoski, O. Kreylos, L. H. Kellogg</i>	
Monitoring of a Creeping Landslide in California Using Spaceborne Radar Interferometry	2991
<i>O. Suncar, D. Dueri, D. Yang, S. Buckley, E. M. Rathje</i>	
Applications of DInSAR for Measuring Mine-Induced Subsidence and Constraining Ground Deformation Model.....	3001
<i>Fitra Ismaya, James Donovan</i>	
Mapping Surface Vesicles of a Cylindrical Basalt Specimen Using Laser Scanning	3011
<i>Nick Hudyma, Ramakrishna Bathini, Alan Harris, Mary M. MacLaughlin</i>	
Lidar-Based Rock-Fall Hazard Characterization of Cliffs	3021
<i>Brian D. Collins, Greg M. Stock</i>	
3-D Stratigraphy and Root Geometry from Trench and Ground-Based LiDAR Mapping	3031
<i>D. Cobos Roa, M. Shiro, N. Sitar, J. Bray, G. Bawden, J. Lichter, R. Evans</i>	

VOLUME 5

Satellite Imaging of Earthquake Geotechnical Highway Damage	3041
<i>M. Turel, J. D. Frost</i>	
Movement and Erosion Quantification of the Johnson Creek, Oregon, Landslide through 3D Laser Scanning	3050
<i>M. J. Olsen, J. C. Allan, G. R. Priest</i>	
Slope Stability Monitoring Using Remote Sensing Techniques	3060
<i>Omar A. Conte, Richard A. Coffman</i>	

Earthquake Damage Assessment Using Objective Image Segmentation: A Case Study of 2010 Haiti Earthquake.....	3069
<i>Thomas Oommen, Umaa RebbaPragada, Daniel Cerminaro</i>	
Reconnaissance-Level Laser Scan of Highway Surface Revealed Slight Depression above Buried Pipeline	3079
<i>Jeffrey R. Keaton</i>	

ADVANCES IN SENSING/MONITORING TECHNIQUES DURING GEOCONSTRUCTION

Real Time Global Subsurface Monitoring Using New Application of Wireless Signal Networks, Proof of Concept.....	3089
<i>Ehsan Ghazanfari, Suk-Un Yoon, Sibel Pamukcu, Muhammed T. Suleiman, Liang Cheng</i>	
Real-Time Health Monitoring System for Power Tunnel.....	3099
<i>X. Y. Xie, L. Feng</i>	
Observational Method Using Real Time Surface Settlement Monitoring: The South Toulon Tunnel Project.....	3109
<i>B. Caro Vargas, M. Beth</i>	
Tunneling Effects on Pile Group Response in Bangkok.....	3119
<i>Thayanan Boonyarak, Charles W. W. Ng</i>	
Maximizing the Benefits of Real Time Monitoring of Geotechnical Construction.....	3129
<i>R. J. Finno, K. S. Kern</i>	
Instrumentation for Tunneling Applications for Block 37 Development in Chicago.....	3139
<i>Alireza Ayoubian, Douglas S. Roy</i>	
Truly Distributed Measurement of Impact Strains in Clay by Use of Embedded BOTDA/R Fiber Optic Sensors	3149
<i>H. Lin, Q. Cui, M. Pervizpour, S. Pamukcu, M. A. Mentzer</i>	
Stiffness Monitoring during Vibratory Compaction of Foundation Soil for Venice Lagoon Restoration Project.....	3159
<i>M. A. Mooney, N. M. Toohey, F. Carnevale</i>	
A Monitoring Information Management System for Tunnel Construction.....	3169
<i>Xiaojun Li, Hehua Zhu, Wenqi Ding, Xuezeng Liu</i>	
Identifying TBM Tunneling Defects through Recognition of Ground Settlement Patterns	3179
<i>Shaoming Liao, Jin Xu, Qizhu Jiao</i>	

ROCK AND UNDERGROUND SPACE

UNDERGROUND SPACE FOR RESILIENT INFRASTRUCTURE

Thermal Modeling of a Mechanical Integrity Test Performed on an Underground Storage Cavern Well.....	3189
<i>B. C. Lampe, J. S. McCartney</i>	
Sustainability and Resilience of Underground Urban Infrastructure: New Approaches to Metrics and Formalism	3199
<i>Priscilla P. Nelson, Raymond L. Sterling</i>	
Analysis of Face Stability of Shield Tunnel under Seepage Condition.....	3209
<i>H. R. Wang, X. L. Lu, Y. L. Liu, M. S. Huang</i>	

DESIGN AND CONSTRUCTION OF ROCK TUNNELS

Engineering Geology and Site Characterization for State Route 710 Tunnel Technical Study	3219
<i>Ravee Raveendra, Yoga Chandran, Ping Tian, Ramon Chavez, Dan Jankly, Abdi Saghaei, Pratheep Piratheepan</i>	
Parameter Identification for Tunnels in Elastoplastic Ground Using a New Tunnel Convergence Model	3229
<i>M. Gutierrez, S. Vardakos, C. Xia</i>	
Modeling Uncertainty in Cutter Wear Prediction for Tunnel Boring Machines	3239
<i>C. Frenzel</i>	
Design of Large-Span Caverns in Rock under Shallow Cover	3248
<i>Sanja Zlatanic, Patrick H. C. Chan</i>	

Analysis of Force Path Diagrams of Linear Cutting Machine—Tests Regarding Geotechnical Parameters	3258
<i>M. Entacher, K. Lassnig, R. Galler</i>	
Seismic Response of Twin Tunnels in Weathered Rocks	3268
<i>S. D. Anitha Kumari, K. S. Vipin, T. G. Sitharam</i>	
Geotechnical Challenges of Transbay Downtown Extension Mined Tunnel	3275
<i>Yiming Sun, Bhaskar Thapa, Steve Klein</i>	
Numerical Analysis of Shaft and Tunnel Design Adjacent to Station Cavern	3285
<i>J. Oh, W. F. Daly, J. Rybarsky, K. Xu</i>	
Construction of a Large-Span Tunnel with Small Overburden in Soft Rocks	3295
<i>J. Q. Ma</i>	
Economical Benefits of Rock Joint Testing	3305
<i>Andre Hawks, Brian Asbury, J. David Rogers, Jamal Rostami</i>	

CHARACTERIZATION AND DESIGN IN ROCK MECHANICS

The Influence of Crack Roughness on the Compression and Shear Strengths of Brittle Fissured Materials	3314
<i>L. E. Vallejo, S. Abu-Ali</i>	
Advanced Geological Detection for Tunneling in Karst Area	3323
<i>Hui Ma, Shougen Chen, Xinrong Tan, Yubao Zhao</i>	
Anisotropic Dilatant Behavior of Rock Fractures	3332
<i>P. Asadollahi, F. Tonon</i>	
Poroelastoplastic Modeling of Borehole Stability	3342
<i>Karrthik Kirupakaran, K. K. "Muralee" Muraleetharan, Younane N. Abousleiman</i>	

CHARACTERIZATION, TREATMENT, AND REHABILITATION OF DAM FOUNDATION IN ROCK

Dewatering at Crane Valley Dam	3352
<i>Frederick C. Rhyner, Jesse Richins, Ahmed Elmekati, Joseph Sun</i>	
Characterization and Treatment of Mélange and Sandstone Foundation at Calaveras Dam	3362
<i>J. W. Roadifer, M. P. Forrest</i>	

GEOENVIRONMENTAL ENGINEERING

RECENT ADVANCES IN GEOENVIRONMENTAL SITE CHARACTERIZATION

A Comparative Study of Soluble Sulfate Measurement Techniques	3372
<i>Nagasreenivasu Talluri, Ahmed Gaily, Anand J. Puppala, Bhaskar Chittoori</i>	
Electronic Nose Combined with Membrane Interface Probe for Detection of VOCs in Water	3382
<i>Z. N. Howard, J. H. Cho, Pradeep Kurup</i>	
Voltammetric Detection of Cadmium in Groundwater	3390
<i>S. Robertson, T. Ponrathnam, J. Cho, R. Nagarajan, P. Kurup</i>	
Determination of Moisture Content and Unit Weight of Clayey Soil Using Resistivity Imaging (RI)	3398
<i>G. Kibria, M. S. Hossain, J. Hossain, M. S. Khan</i>	
The Effect of Turbidity on Raman Spectroscopic Analysis of Aqueous Chlorinated Samples	3408
<i>C. K. Monwuba, J. V. Sinfield</i>	

HYDRAULIC PROPERTIES AND HYDROLOGY OF WASTE CONTAINMENT SYSTEMS

Membrane Behavior of Engineered Clay Barriers for Geoenvironmental Containment: State of the Art	3419
<i>C. D. Shackelford</i>	
Long Term In Situ Measurements of the Volumetric Water Content in a Soil-Bentonite Slurry Trench Cutoff Wall	3429
<i>D. G. Ruffing, J. C. Evans, M. A. Malusis</i>	

Determination of Key Hydraulic Characteristics of the Vertical Bentonite Barrier As an Old Sanitary Landfill Containment	3437
<i>E. Koda</i>	
Assessment of Heavy Metals Retention in GCLs by Column and Batch Tests.....	3447
<i>Francesco Mazzieri</i>	
Water Balance of an Earth Fill Built of Slightly Contaminated Organic Clay	3457
<i>E. Birle, D. Heyer</i>	
Centrifuge Model Studies on the Behaviour of Composite Covers of Landfills Subjected to Differential Settlements.....	3467
<i>P. V. Divya, B. V. S. Viswanadham, J. P. Gourc</i>	
Experimental and Numerical Evaluation of Liquid Injection Using Horizontal Trench System for Bioreactor Landfills.....	3477
<i>Milind V. Khire, Tryambak Kaushik</i>	
Centrifuge Testing of Unsaturated Hydraulic Properties of Municipal Solid Waste.....	3487
<i>Milind V. Khire, Duraisamy S. Saravanathiiban</i>	
Unsaturated Hydraulic Conductivity Behavior of Bagasse Ash Treated Tropical Black Clay	3497
<i>K. J. Osinubi, T. S. Ijimdiya</i>	
Experimental Studies of GCL Hydration from Subsoil.....	3507
<i>M. T. Rayhani</i>	

GEOENVIRONMENTAL CASE HISTORIES: CHALLENGES AND INNOVATION

Centrifuge Modeling of LNAPL Migration with a Soil-Cement Barrier in Case of Flow and No-Flow Conditions	3513
<i>Chusak Kererat, Inthuorn Sasankul, Suttisak Soralump</i>	
Permeable Reactive Barrier (PRB) Technology: An Innovative Solution for the Remediation of Acidic Groundwater from Acid Sulphate Soil (ASS) Terrain	3523
<i>Laura Banasiak, Buddhima Indraratna</i>	
The Importance of Hydrogeologic Characterization and Analysis to Avoid Off-Site Impacts in Highway Construction.....	3533
<i>Daniel B. Stephens, Farag E. Botros, Stanley Helenschmidt, Bill Casadevall, Peter Quinlan, Daniel Davis</i>	
Hydrogeological and Engineering Geological Significance of Fault Debris Fractal Dimension	3543
<i>Fuqing Wang</i>	
Case Study—Puerto Rico Test Site for Exploring Contamination Threats.....	3553
<i>José F. Cordero, John D. Meeker, Thomas Sheahan, Ingrid Padilla, Roger Giese, Michael B. Silevitch, Rita Loch-Caruso, David Kaeli, Akram N. Alshawabkeh</i>	
Remediation of a Former MGP Site in Norwich, New York: A Case Study.....	3563
<i>Carsten H. Floess, Scott Underhill, Tracy Blazicek, Matthew Thorpe, Scott McDonough, Reeti Doshi</i>	
Bank Stabilization at Geyserville Bridge Site Using Re-Directive and Bioengineering Measures.....	3573
<i>J. McCullah, D. H. Gray, D. Yam</i>	
Unique Design and Quality Control of Cement Deep Soil Mixing for Water Cutoff: BART Warm Springs Extension (WSX) Project, Fremont, CA	3583
<i>Thomas S. Lee, Douglas R. Jenevein, Mitchell L. Fong</i>	
Hydraulic Conductivity of Environmentally Controlled Landfill Liner Test Pad	3593
<i>Camila Maldonado, Richard A. Coffman</i>	
Field Evaluation of Permeable Blanket for Leachate Recirculation	3603
<i>S. R. Manzur, M. S. Hossain, V. Kemler, D. Dugger</i>	
Performance of Horizontal Gas Collection System in an ELR Landfill.....	3613
<i>S. R. Manzur, M. S. Hossain, V. Kemler, D. Dugger</i>	
Characterization, Risk Assessment, and Remediation Scenario at a Closed Contaminated Industrial Site	3624
<i>M. Di Sante, F. Mazzieri, E. Pasqualini, C. Ruggeri, A. Del Frate</i>	
Construction of MSE Walls at St. Anthony Falls (I-35W) Bridge.....	3634
<i>Sachin Mandavkar, Anamarie Stralla, Nageswarreddy V. Kanati</i>	

BENEFICIAL REUSE OF WASTE AND RECYCLED MATERIALS IN SUSTAINABLE GEOTECHNICAL CONSTRUCTION

Viability of Recycled and Waste Materials As Green Roof Substrates	3644
<i>T. B. Carson, R. Hakimdarvar, K. J. Sjoblom, P. J. Culligan</i>	

Utilization of Mine Tailings As Road Base Material.....	3654
<i>Saeed Ahmari, Rui Chen, Liyangang Zhang</i>	
Potential Use of Recycled Crushed Concrete-Recycled Crushed Glass Blends in Pavement Subbase Applications.....	3662
<i>M. M. Y. Ali, A. Arulrajah</i>	
Evaluation of Fly Ash and Soil Mixtures for Use in Highway Embankments.....	3672
<i>Lin Li, Fabio Santos, Yadong Li, Wei Shao, Qian Zhao, Farshad Amini</i>	
Sustainable Use of Low Lime Fly Ashes in Geotechnical and Geoenvironmental Applications	3681
<i>Arif Ali Baig Moghal, Afzal Ali Baig Moghal</i>	
Recycled Portland Cement Concrete Pavement Modulus Evaluation Using Surface Waves.....	3691
<i>Hudson Jackson, Nenad Gucunski</i>	
Soil Modification with Shredded Rubber Tires	3701
<i>Binod Tiwari, Beena Ajmera, Suzanne Moubayed, Alexander Lemmon, Kelby Styler</i>	
Volumetric and Mechanistic Characteristics of Asphalt Mixes Containing Recycled Asphalt Pavement	3709
<i>Pranshoo Solanki, Zahid Hossain, Musharraf Zaman, David Adje</i>	
Mechanistic Evaluation of Recovered Materials from Recycled Asphalt Pavement.....	3719
<i>Zahid Hossain, Pranshoo Solanki, Musharraf Zaman</i>	
pH-Dependent Leaching of Trace Elements from Recycled Concrete Aggregate.....	3729
<i>Jiannan Chen, Sabrina Bradshaw, Craig H. Benson, James M. Tinjum, Tuncer B. Edil</i>	
Numerical Modeling for Remedial Measures of Shallow Slope Failure Using Recycled Plastic Pins.....	3739
<i>J. Hossain, M. S. Hossain</i>	
Durability Characteristics of Sustainable Pervious Pavement Materials	3747
<i>Jabber Al-Bihani, Chibukem Okoro, Mohamed Abubakr, Noura Abu Al Faraj, Naji Khouri</i>	
Manganese and Chromium Leaching from High Carbon Fly Ash Amended Embankments.....	3756
<i>Bora Cetin, Ahmet H. Aydilek, Lin Li</i>	
Testing Framework Development for Use of CCPs in Large-Volume Applications	3765
<i>Nicholas T. Plaks, Angelica M. Palomino, Barry E. Scheetz</i>	
Experimental Evaluation of Lime Sludge Performance in Subgrade Stabilization	3775
<i>Bin Zhang, Xiong (Bill) Yu</i>	

VOLUME 6

Centrifuge Model Tests on Rail Embankments Constructed with Coal Ash As a Structural Fill Material	3786
<i>B. V. S. Viswanadham, A. Das, V. K. Mathur</i>	
Shear Strength and Permeability of Granite Residual Soil Contaminated with Urban Solid Waste Leachate	3796
<i>L. J. Andrade Pais, L. M. Ferreira Gomes, I. M. C. F. G. Falorca</i>	
Solidification/Stabilization of Hospital Solid Waste Incinerator Ash for Utilization in Geotechnical Construction.....	3806
<i>S. M. Ali Jawaid, J. Kaushik</i>	
Comparative Analysis between Properties of Steel Slag, Fly Ash, and Clay Bricks	3816
<i>Samitnjay Sadashivrao Bansode</i>	
Characterization of Compacted Coal Wash As Structural Fill Material.....	3826
<i>B. Indraratna, C. Rujikiatkamjorn, G. Chiaro</i>	
Strength Consideration in the Use of Lateritic Soil Stabilized with Fly Ash As Liners and Covers in Waste Landfills	3835
<i>A. A. Amadi, A. O. Eberemu, K. J. Osinubi</i>	
Use of Bottom Ash In Lieu of Sand As Filter in Ash Dyke Embankment.....	3845
<i>J. Kumar, D. N. Naresh</i>	
Cement Kiln Dust Stabilization of Reclaimed Asphalt Pavement	3854
<i>J. E. Edeh, J. I. Nor, K. J. Osinubi</i>	
Rice Husk Ash Stabilization of Reclaimed Asphalt Pavement Using Cement As Additive	3863
<i>J. E. Edeh, O. J. J. Onche, K. J. Osinubi</i>	
Use of Fly-Ash and Sewage Sludge and Bioengineering As the Erosion Control Elements on Sanitary Landfill Slopes	3873
<i>E. Koda, P. Osinski, M. Glazewski</i>	

Experimental Study on Application of Industrial Waste in Landfill Liner	3881
<i>Yating Yang, Qingbo Wen, Liming Hu</i>	
Alternative Geotextile Tube Fill Materials for Marine Applications	3891
<i>Isaac L. Howard, Ed Trainer, Tack Weng Yee</i>	
Resilient Modulus of Recycled Asphalt Pavement and Recycled Concrete Aggregate.....	3901
<i>Ozlem Bozyurt, James M. Tinjum, Young-Hwan Son, Tuncer B. Edil, Craig H. Benson</i>	
Hydraulic Conductivity of Porous Plastic-Based Cementitious Material under Clogged and Unclogged Conditions	3911
<i>Parin Patel, Stephen Dobron, Corben Fuentespina, Chinhang So, Naji Khoury</i>	
Improvement of Strength of Expansive Soil with Waste Granulated Blast Furnace Slag.....	3920
<i>Anil Kumar Sharma, P. V. Sivapullaiah</i>	
Stabilization of Clayey Soils Using Fly Ash and Homopolymerpolypropylene	3929
<i>Aykut Senol, Ehsan Eminan, C. Guneysu Olgun</i>	

ADVANCES IN HEAVY METAL SOIL TREATMENT

Scale Effects on As and Cr Mobility and Immobilization in Contaminated Soils	3939
<i>H. Weigand</i>	
Effect of Temperature on the Heavy Metal Retention Characteristics of Semi-Arid Soils of Saudi Arabia	3949
<i>Arif Ali Baig Moghal, Mosleh Ali Al-Shamrani</i>	
Reduction of Chromium(VI) in Saturated Zone Sediments by Calcium Polysulfide and Nanoscale Zerovalent Iron Derived from Green Tea Extract.....	3959
<i>Maria Chrysochoou, Chad P. Johnston</i>	
Hazardous Metal Stabilization through Thermal Reactions with Clay Materials	3968
<i>Kaimin Shih, Xiuqing Lu</i>	
The Use of Natural Zeolites As a Sorbent for Treatment of Dissolved Heavy Metals in Stormwater Runoff	3978
<i>Christopher S. Gray, Susan E. Burns, Jon D. Griffith</i>	
Immobilization of Sb(III) and Sb(V) Using Steel Slag Fines	3988
<i>S. C. Jagupilla, D. G. Grubb, M. Wazne</i>	
Use of Citric Acid Industrial Wastewater to Enhance Electrochemical Remediation of Cadmium-Contaminated Natural Clay	3995
<i>Ying-Ying Gu, Albert T. Yeung</i>	
Waste for Waste: A New Management Approach in Deteriorated Soil Remediation.....	4005
<i>Orsolya Klebercz, Viktoria Feigl, Emese Vaszita, Katalin Gruiz, Judit Kovács, Viktor Kofalusi</i>	
Effect of Acid Rain on Chemical and Hydraulic Properties of Cement Solidified/Stabilized Lead Contaminated Marine Soft Clay.....	4015
<i>Ning-Jun Jiang, Yan-Jun Du, Chen-Yang Li, Kai-Wen Lu, Song-Yu Liu, Ming-Li Wei</i>	
Electrochemical Reduction of Selenate Using Reactive Anode	4024
<i>Kitae Baek, Naji Kasem, Ali Ciblak, Dorothy Vesper, Ingrid Padilla, Akram N. Alshawabkeh</i>	
Metals Immobilization and Removal Rates of Se(IV) and Se(VI) by Steel Slag Fines Media	4033
<i>S. C. Jagupilla, D. G. Grubb, M. Wazne</i>	
Compression Behavior of Zinc Contaminated Clayey Soils Solidified with Cement	4042
<i>Ming-Li Wei, Yan-Jun Du, Ning-Jun Jiang</i>	

GEOTECHNICS OF SEDIMENT REMEDIATION

Improvement of Sediment-Water Quality by Resuspension	4050
<i>Masaharu Fukue, Tetsuro Kodera, Hidenori Kouge, Yoshio Sato, Mahiro Yamana, Catherine Mulligan</i>	
Experimental Study on Electro-Osmotic Consolidation of Expansive Soils	4060
<i>Hui Wu, Liming Hu</i>	
A Strain-Based Model to Screen for Residual Pore Pressures in Sediment Caps	4069
<i>Aaron S. Bradshaw</i>	
Effect of Sand Column Inclusions on the Drained Response of Soft Clays.....	4079
<i>S. S. Najjar, S. Sadek, M. Zakharia, S. Khalaf</i>	
Electrically Assisted Recovery of Immiscible Hydrocarbon Liquids from Clay Formations.....	4089
<i>Reena Amatya Shrestha, Alla Miroshnik, Ehsan Ghazanfari, Sibel Pamukcu</i>	
Electrically Induced Transport of Immiscible Hydrocarbons in Clay Soil.....	4097
<i>Alla Miroshnik, Ehsan Ghazanfari, Reena Amatya Shrestha, Sibel Pamukcu</i>	

Consolidation Properties of NAPL Contaminated Sediments	4107
<i>M. B. Erten, C. S. El Mohtar, D. D. Reible, R. B. Gilbert</i>	

MANAGEMENT OF MINE TAILINGS: ADVANCES AND CASE STUDIES

Mine Paste Backfill—The Behaviour of Thickened Tailings and Pipeline Design	4116
<i>Tamás Meggyes, Stephan A. Jeffries</i>	
Paste and Thickened Tailings: Has the Promise Been Fulfilled?.....	4126
<i>Andy Fourie</i>	
Development of an Impoundment Inspection and Verification Tool	4136
<i>Eric Baker, Melissa O'Neal, John D. Quaranta</i>	
Incorporating EAP Tabletop Exercises with Crisis Management Planning for Coal Waste Impoundment Management.....	4146
<i>John D. Quaranta, Hope M. Coffield</i>	
Environmental Risk Assessment of Red Mud Contaminated Land in Hungary.....	4156
<i>Katalin Gruiz, Viktória Feigl, Orsolya Klebercz, Attila Anton, Emese Vaszita</i>	
The Use of Waste Rock Inclusions to Improve the Seismic Stability of Tailings Impoundments	4166
<i>M. James, M. Aubertin</i>	

LANDFILL SETTLEMENT

Settlement Analysis of MSW Based on Constitutive Modeling Approach.....	4176
<i>Sandeep K. Chouksey, G. L. Sivakumar Babu, Krishna R. Reddy</i>	
Evaluation of Waste Compressibility Due to Preloading at the Fresh Kills Landfill.....	4184
<i>L. de Melo, R. El-Sherbiny, W. Steier, M. Salem</i>	
Use of Settlement Profilers in a Full-Scale Bioreactor Landfill	4194
<i>Vijayamala C. Hettiarachchi, Kevin C. Foye, Xianda Zhao</i>	
The City of Calgary Biocell Landfill: Data Collection and Settlement Predictions Using a Multiphase Model	4202
<i>C. A. Hunte, C. H. Hettiarachchi, J. N. Meegoda, J. P. A. Hettiarachchi</i>	
Recent Findings on Compressibility of Municipal Solid Waste	4212
<i>Christopher A. Bareither, Craig H. Benson, Tuncer B. Edil</i>	
Settlement Behavior of Bioreactor Landfills in North America	4222
<i>Hiroshan Hettiarachchi</i>	
Settlement Monitoring Program for a Proposed Multipurpose Site Development	4232
<i>Hari D. Sharma, Jason Lin, Fabrizio W. Settepani, Jessica A. Bernardini</i>	
Settlement Due to Anaerobic Biodegradation from Laboratory Landfill Simulators	4242
<i>X. Fei, D. Zekkos</i>	

EMERGING TOPICS IN GEOTECHNICAL ENGINEERING

SUSTAINABILITY IN GEOTECHNICAL ENGINEERING

A Quantitative Sustainability Indicator System for Pile Foundations	4252
<i>A. Misra, D. Basu</i>	
Load Bearing Capacity of Footing Resting on the Fly Ash Slope with Multilayer Reinforcements	4262
<i>K. S. Gill, A. K. Choudhary, J. N. Jha, S. K. Shukla</i>	
Feasibility Study of Compressed Air Energy Storage Using Steel Pipe Piles	4272
<i>Lianyang Zhang, Saeed Ahmadi, Ben Sternberg, Muniram Budhu</i>	
Sustainable Reutilization of Excavated Trench Material.....	4280
<i>Bhaskar Chittoori, Anand J. Puppala, Rajinikanth Reddy, David Marshall</i>	
Fragility Analysis of Nondisplacement Piles in Sand.....	4290
<i>Prasenjit Basu</i>	
Calculations of Axial Pile Capacity under Sustained Cyclic Loading for Offshore Wind Turbine Foundations	4299
<i>Maosong Huang, Ying Liu, Shuai Li</i>	
Sustainable Utility Placement for University Campuses	4309
<i>D. V. L. Hunt, I. Jefferson, N. K. Drinkwater, C. D. F. Rogers</i>	
Carbon Footprint Evaluation of Clay Liner Options at a Coal Combustion Residual Disposal Facility	4319
<i>Marat Goldenberg, Chris Athanassopoulos</i>	

Effect of Decomposition on the Compressibility of Fibrous Peat	4329
<i>S. Pichan, B. C. O'Kelly</i>	
A Method for Dynamic Risk Assessment of the Operating Power Tunnel	4339
<i>X. Y. Xie, Y. B. Yang</i>	
Green Remediation of Soil and Groundwater by Electrochemical Methods.....	4348
<i>Kitae Baek, Xuhui Mao, Ali Ciblak, Akram N. Alshawabkeh</i>	
Shear Strength of Water-Repellent Hydrophobic Granular Media.....	4358
<i>Yong-Hoon Byun, Horacio Jose Varona Morato, Tae Sup Yun, Jong-Sub Lee</i>	
 <u>THERMALLY ACTIVE GEOTECHNICAL ENGINEERING SYSTEMS</u>	
Comparison of Laboratory Methods for Measuring Thermal Conductivity of Unsaturated Soils.....	4366
<i>W. J. Likos, H. S. Olson, R. Jaafar</i>	
Strain Distributions in Centrifuge Model Energy Foundations.....	4376
<i>Melissa A. Stewart, John S. McCartney</i>	
Efficiency of a Community-Scale Borehole Thermal Energy Storage Technique for Solar Thermal Energy.....	4386
<i>Ronglei Zhang, Ning Lu, Yu-shu Wu</i>	
Field and Laboratory Investigation of a Heat Exchanger Pile.....	4396
<i>B. Wang, A. Bouazza, D. Barry-Macaulay, M. R. Singh, M. Webster, C. Haberfield, G. Chapman, S. Baycan</i>	
Coupled Thermo-Poro-Mechanical Finite Element Analysis of an Energy Foundation Centrifuge Experiment in Saturated Silt	4406
<i>W. Wang, R. A. Regueiro, M. Stewart, J. S. McCartney</i>	
Impact of Shear-Induced Anisotropy on the Thermal Conductivity of Granular Soils	4416
<i>U. El Shamy</i>	
Impact of Moisture Migration on Thermal Resistivity Testing in Unsaturated Soil.....	4426
<i>N. R. Woodward, J. M. Tinjum</i>	
Thermal Conductivity Testing of Energy Piles: Field Testing and Numerical Modeling.....	4436
<i>Tolga Ozudogru, Tracy Brettmann, C. Guney Olgun, James R. Martin II, Aykut Senol</i>	
Preparation of Polymer Coated Sands with Reversible Wettability Triggered by Temperature	4446
<i>Yi Dong, Sibel Pamukcu</i>	
Frost-Induced Heaving of Soil around a Culvert.....	4456
<i>Yao Zhang, Radoslaw L. Michalowski</i>	
Evaluation of Thermal Soil-Structure Interaction in Energy Foundations Using an Impulse-Response Test.....	4466
<i>A. Khosravi, S. Abdelrahman, J. S. McCartney</i>	
Impact of the Rate of Heating on the Thermal Consolidation of Saturated Silt.....	4476
<i>Alexander Vega, Charles J. R. Coccia, Abdalla El Tawati, John S. McCartney</i>	
Stress-Dependent Thermal Conductivity Evolution of Granular Materials.....	4486
<i>Jinhyun Choo, Jung Hwoon Lee, Jangguen Lee, YoungSeok Kim, Tae Sup Yun</i>	
Thermal Resistivity and Moisture Migration of Soil and Cable Trench Backfill.....	4495
<i>Albert T. Yeung, Derek V. Morris</i>	
Author Index	