

Sociedad Venezolana de Geotecnia

13<sup>th</sup> Panamerican Conference  
on Soil Mechanics and  
Geotechnical Engineering  
2007

July 16-20, 2007  
Margarita Island, Venezuela

Volume 1 of 2

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

ISBN: 978-1-60560-376-6

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

Copyright (2007) by the Sociedad Venezolana de Geotecnia.

All rights reserved.

For permission requests, please contact the Sociedad Venezolana de Geotecnia at the address below.

Sociedad Venezolana de Geotecnia  
Nucleo A. Piso 7  
A75 Chacao Caracas  
1060 4902 Venezuela  
Telf/Fax: +58 212 571.3824

[civ.svdg@gmail.com](mailto:civ.svdg@gmail.com)

Sociedad Venezolana de Geotecnia  
13<sup>th</sup> Panamerican Conference on Soil  
Mechanics and Geotechnical Engineering  
2007

**TABLE OF CONTENTS**

**VOLUME 1**

<b>Foundation Solution of the a New Alternative Viaduct for the highway Caracas-La Guaira</b> .....	1
<i>Pedro Carrillo</i>	
<b>Uncertainties and Approximations in Geotechnics</b> .....	12
<i>E. Núñez</i>	
<b>Correlation Between the Climatic Parameters and the Movements of a Footing Laid the Foundations on Expansive Rocks, to the Southwest of Ecuador</b> .....	40
<i>Luis Marín-Nieto</i>	
<b>Anchored Rock Foundation Design</b> .....	45
<i>R. Terzariol, P. Arrúa, G. Aiassa</i>	
<b>The Foundation and the Earthquake Resistant Design of the Potrerillos Dam</b> .....	51
<i>Arnaldo M. Barchiesi, José F. Toso, Ascensio Lara, Alain J. Carrere</i>	
<b>Soil-geosynthetic Interaction: Modelling and Analysis</b> .....	N/A
<i>E. Palmeira</i>	
<b>Elastic Settlement of Shallow Foundations on Granular Soil--an Overview</b> .....	N/A
<i>B. Das</i>	
<b>Model Pile Groups in Sand Subjected to Lateral Soil Movement</b> .....	59
<i>Eng How Ghee, Wei Dong Guo</i>	
<b>Back-analysis of Flight Auger Pile Load Tests in the Soil of Goiânia, Brazil</b> .....	65
<i>M. M. Sales, R. P. Cunha, P. H. L. Magalhães</i>	
<b>Design and Performance of Deep Steel Piles with Varied Section</b> .....	71
<i>Alexandre Duarte Gusmão, Jaime De A. Gusmão Filho, Gilmar De Brito Maia</i>	
<b>Tools to Forecast the Behavior of CFA Piles Founded in Tropical Soil</b> .....	81
<i>G. J. M., Anjos, R. P. Cunha, A. M. Pando, M. E. Ruiz</i>	
<b>Bearing Capacity of Irregular (triangular) Shaped Mudmat Foundations</b> .....	86
<i>K. J. L. Stone, T. A. Newson, W. Vanadit-Ellis</i>	
<b>Soil Structure Interaction in the Analysis and Seismic Design of Reinforced Concrete Frame Buildings</b> .....	92
<i>Julio A. García</i>	
<b>3D Numerical Analysis of Actual and Future Behavior of a Group of Buildings Constructed on Mexico City Lacustrine Clays</b> .....	98
<i>N. P. López-Acosta, G. Auvinet, J. F. Rodríguez</i>	
<b>Geogrid-reinforced and Pile-supported Roadway Embankment</b> .....	108
<i>Reinaldo Vega-Meyer, Yong Shao</i>	

<b>Installation of Micropiles, Steel H-piles and Drilled Shafts in Charlotte's Light Rail Construction</b> .....	115
<i>Y. Huang, D. S. Lipka And M. Truzman</i>	
<b>Probabilistic Design Procedure That Includes Pile-pinning for Bridge Foundations Undergoing Liquefaction Induced Lateral Spreading</b> .....	122
<i>C. Ledesma, J. D. Bray</i>	
<b>Design of the Foundation Retrofit and Monitoring Instrumentation for Bridge No. 91 Over the Yadkin River, North Carolina, USA</b> .....	129
<i>M. Truzman, D. Corley, J. Fargher, T. Sherrill, D. Hardister</i>	
<b>Dynamic Impedance Functions for Piers and Piles Embedded in Layered Media</b> .....	135
<i>H. R. Aguilar, J. Avilés</i>	
<b>Direct Foundations on Sand with Square Bases, a Proposal of Calculation.</b> .....	143
<i>Augusto José Leoni</i>	
<b>Probabilistic Settlement Analysis by Stochastic and Random Finite Element Methods</b> .....	151
<i>D. V. Griffith, Gordon A. Fenton</i>	
<b>Effect of Pile Diameter on Lateral Resistance in Sand from Full-scale Tests</b> .....	162
<i>Kyle M. Rollins, Amy J. Taylor</i>	
<b>Recent Developments in Reinforced Soil Wall Testing, Analysis and Design</b> .....	N/A
<i>Richard Bathurst</i>	
<b>Influence of Shear Zones on the Stability of Schist Rocks</b> .....	N/A
<i>Alberto Marulanda</i>	
<b>Behavior of Instrumented Continuous Flight Auger Piles in Sedimentary and Residual Soils</b> .....	168
<i>P. J. R. De Albuquerque, D. De Carvalho, C. T. D. B. Alledí, U. F. Polido</i>	
<b>Notes on Design of Micropiles As Foundation Elements</b> .....	174
<i>Jesús Gómez, Allen Cadden, Javier Rodríguez</i>	
<b>Modelling of Rigid Inclusions in Consolidating Soils</b> .....	187
<i>G. Auvinet, J. F. Rodríguez</i>	
<b>Numerical Modeling of Soil Deformation and Excess Pore Pressure Field around a Closed Ended Pile</b> .....	195
<i>Juan F. P Erri, Juan M. Pestana, Charles Aubeny</i>	
<b>Octagonal Mat Foundation for Support of Heavy Ring Crane</b> .....	201
<i>J. L. M. Clemente, M. Anderson</i>	
<b>Development of Synthetic Ground Motions for the June 23rd 2001 Southern Peru Earthquake</b> .....	208
<i>W. Silva, A. Rodriguez-Marek, J. Wartman</i>	
<b>Infiltration of Compacted Silty Clay Loess Soil</b> .....	214
<i>R. Terzariol, M. Zeballos, G. Aiassa</i>	
<b>Constitutive Model Analysis for Silty Loess Soils</b> .....	220
<i>G. Aiassa, M. Zeballos, R. Terzariol</i>	
<b>A Constitutive Model for Sands: Evaluation of Predictive Capability</b> .....	226
<i>A. Sfriso</i>	
<b>Micro-scale Analysis of Immiscible Displacement in Porous Media</b> .....	232
<i>F. M. Francisca, M. A. Montoro</i>	

<b>Study of Suction in Unsaturated Soils Applied to Pavement Mechanics</b> .....	238
<i>B. Silva, L. Motta, A. Vieira</i>	
<b>Soil-water Retention of Curve Measured with Different Methods</b> .....	245
<i>M. A. Alfaro Soto, O. M. Vilar</i>	
<b>Evaluation of the Liquefaction Potential of the Fosfertil Gypsum</b> .....	251
<i>Alexandre Gonçalves Santos, Paulo César Abrão, Marco Antônio Diniz, Juliana Fonseca Moura, Ludmila Magalhães E Souza</i>	
<b>Evaluation of the Effects of the Grain Size Segregation in the Permeability of an Iron Tailing</b> .....	257
<i>Alexandre Gonçalves Santos, Luís Fernando Martins Ribeiro, Ludmila Magalhães E Souza</i>	
<b>Recent Considerations in Design of Filters for Earth Dams and Rock Barriers</b> .....	N/A
<i>R. Flores</i>	
<b>Bearing Capacity of Floating Precast Piles Driven in Clay Deposits</b> .....	N/A
<i>F. L. Soares, R. Q. Coutinho, A. D. Gusmão</i>	
<b>Role of Performance Monitoring in Risk Management</b> .....	N/A
<i>Allen Marr</i>	
<b>Evaluation of the Methodology for Determination of the Iron Content of an Iron Tailing</b> .....	263
<i>Alexandre Gonçalves Santos, Luís Fernando Martins Ribeiro, Ludmila Magalhães E Souza</i>	
<b>Geotechnical Characterization of the Calcareous Soil from a Landslide in Pernambuco, Brazil</b> .....	269
<i>M. M. Silva, R. Q. Coutinho, W. A. Lacerda</i>	
<b>The Use of Drill Cuttings As Pavement Material</b> .....	275
<i>J. T. Araruna Jr., P. J. M. Pires, R. C. Vaqueiro</i>	
<b>Influence of Curing Conditions on K<sub>0</sub> in an Artificially Cemented Soil</b> .....	281
<i>A. P. S. Santos, N. C. Consoli, K. S. Heineck</i>	
<b>Lateritic Behaviour of the Colluvial Soil from Campinas-SP-Brasil</b> .....	287
<i>M. G. Miguel, P. J. R. De Albuquerque, G. S. De Azevedo, G. S. V. Da Silva, D. De Carvalho</i>	
<b>Properties of Collapsible Soils of Uberlândia- Brazil</b> .....	293
<i>M. E. B. Rezende, L. C. G. árabe, N. Gaioto</i>	
<b>Geotechnical Mapping for Septic Tank and Cesspool of the Manaus-am</b> .....	300
<i>Antonio Henriques Bento, Wallace Vargas Roque</i>	
<b>Three-dimensional Flow Analysis of Macusani Dam - Peru</b> .....	306
<i>Jackeline Castañeda, Celso Romanel</i>	
<b>Study of the Geometrical Condition of Mining Waste Beaches Obtained with the Use of the Hydraulic Deposition Simulation Equipment (HDSE)</b> .....	312
<i>H. Hernandez, A. Assís</i>	
<b>Study of the Collapsibility of a Brasília Clay Due Contaminants Flow</b> .....	318
<i>J. Silva, P. Murrieta, L. Tejada</i>	
<b>Determination of Geotechnical Properties of Barreiras Formation Sediments in the Coast East of Rio Grande Do Norte - Brazil</b> .....	324
<i>R. N. F. Severo, O. Freitas Neto, O. F. Santos Júnior</i>	
<b>Geotechnical Aspects of Berth No. 4 Upgrade, Port of Bridgetown, Barbados</b> .....	330
<i>M. Yogendrakumar, T. P. Fitzell, W. M. Gilmer</i>	

<b>Modeling of the Redistribution of Loads Around Buried Square Culverts</b> .....	336
<i>T. Newson, M. Kanungo, K. Stone</i>	
<b>Use of Waste Materials to Improve the Seismic Resistance of Adobe</b> .....	342
<i>M. S. Islam, M. Kanungo</i>	
<b>Waste Rock Behavior at High Pressures</b> .....	348
<i>Edgar Bard O., José Campaña Z., María Eugenia Anabalón A. Arcadis Chile, Reinaldo Apablaza V.</i>	
<b>Numerical Modelling of Stress in Internal Erosion</b> .....	354
<i>Ricardo Moffat C., Abelardo Julio A.</i>	
<b>Soil Nailing: Practice and Research</b> .....	N/A
<i>Alberto Sayão</i>	
<b>Some Methods for the Improvement of the Geotechnical Properties of Slurried Mine Wastes</b> .....	N/A
<i>Tim Newson</i>	
<b>Hurricane Katrina – New Orleans Levee Damage Observations</b> .....	N/A
<i>Francisco Silva</i>	
<b>High Waste Rock Dumps in the Mining Industry</b> .....	360
<i>L. Valenzuela, E. Bard, J. Campaña</i>	
<b>Applicability of the H/V Spectral Ratio in the Seismic Response of the Santiago Basin, Chile</b> .....	366
<i>R. Verdugo, C. Pastén</i>	
<b>Cyclic Behavior of Bogotá Unbound Aggregates</b> .....	372
<i>B. Caicedo, O. Coronado, J. M. Fleureau, A. Gomes Correia</i>	
<b>A Geotechnical Model for the Subsoil of the Bogotá Sabana</b> .....	378
<i>J. A. Rodríguez, J. P. Escallón</i>	
<b>Influence of Expansive Potential on Final Settlements Predictions in Constructions</b> .....	384
<i>M. L. Pérez-Rea, T. Ayala-Ibarra</i>	
<b>Drained Behaviour Description for the Weald Clay</b> .....	389
<i>R. Rivera-Constantino, E. Juárez-Badillo, A. Herrera-Canseco</i>	
<b>Effects of Drying Soils in Light Buildings</b> .....	397
<i>J. L. Rangel-Núñez, E. Ibarra-Razo, N. Contreras-Palares</i>	
<b>Effects of Microfossils on the Soils Behavior</b> .....	403
<i>J. A. Díaz-Rodríguez, O. E. Nava-Tristán</i>	
<b>The New Geotechnical Map for Mexico Valley Subsoil</b> .....	410
<i>M. Juárez, G. Auvinet, E. Méndez</i>	
<b>Study on Dispersivity and Erodibility of Clayey Soils</b> .....	416
<i>G. Silva G-P, J. Rendón H.</i>	
<b>Influence of Non-saturation and Particle Size Distribution on the Stiffness of Granite Materials</b> .....	424
<i>A. Gomes Correia , S. M. Reis Ferreira, J-M. Fleureau</i>	
<b>The Geotechnical Re-use of Portuguese Inert Siderurgical Aggregate</b> .....	429
<i>A. J. Roque, Eduardo Fortunato, A. Gomes Correia, S. M. Sandra Ferreira, Fernando Pardo De Santayana, Fernando Castro, Luísa Trigo</i>	
<b>Geotechnical Studies in the Esplanade of the M´Bopicuá Pulp Mill (Uruguay)</b> .....	435
<i>A. Gutiérrez, V. Umpiérrez</i>	

<b>An Energy-flux Solution to Clear-water Scour of a Circular Pier</b> .....	440
<i>M. Falcón, E. Hernández</i>	
<b>Modeling of the Dynamic Properties of Compacted Saturated Soils</b> .....	444
<i>C. M. González-Blandón, O. Flores-Castrellón, M. P. Romo-Organista, C. Dorado-Santana</i>	
<b>Geotechnical Rehabilitation on Home Buildings in México City</b> .....	450
<i>H. S. Haas</i>	
<b>General Theoretical Equations for Cyclic Shear Response of Granular Soils</b> .....	456
<i>E. Juárez-Badillo</i>	
<b>Mathematical Characterization of the Compression to 100,000 kg/cm<sup>2</sup> of Thirty-two Substances</b> .....	463
<i>E. Juárez-Badillo, S. Hernández-Mira</i>	
<b>Influence of Dessiccation on Volume Change Behavior of Bogota Clay</b> .....	469
<i>J. A. Pineda-Jaimes, J. E. Colmenares-Montañez</i>	
<b>Study of Geologic Risks at the Hydrographic River Basin of the River El Limón. Aragua State, Venezuela</b> .....	475
<i>K. Briceño, Y. Sánchez, M. Uzcátegui, L. González</i>	
<b>Use of Tubular Geocompounds in the Protection of Coastal Areas.</b> .....	480
<i>C. Blanco Sirit, M. Prieto, E. Alió</i>	
<b>Undergraduate Thesis on the Teaching Learning Process of Geotechnical Engineering</b> .....	485
<i>J. J. Bosío</i>	

## VOLUME 2

<b>Asunción City Geotechnical Map</b> .....	490
<i>N. Cantero, L. Lugo, L. Ramírez, R. Gómez, L. Amábile, R. Franco</i>	
<b>Physical and Numerical Modeling of a Pipeline Shallowly Buried in Sandy Soil Subjected to Lateral Load</b> .....	496
<i>M. C. F. Almeida, M. S. S. Almeida, L. A. Pacheco, J. R. M. S. Oliveira, R. Garske</i>	
<b>Mechanical Behavior of an Artificially Cemented Soil Cured Under Stress</b> .....	502
<i>F. D. Rosa, N. C. Consoli, K. S. Heineck</i>	
<b>Secondary Consolidation of Marine Clays Revealed by Measured Building Settlements in Santos and São Vicente, Brazil</b> .....	507
<i>F. Massad</i>	
<b>Correlation Between the Maximum Shear Modulus and the Undrained Strength of a Remolded Marine Clay</b> .....	514
<i>José Maria De Camargo Barros, Rosana Marília Da Silva Silveira, Cláudio Dos Santos Amaral</i>	
<b>Numerical Simulation of the Behavior of Central Core Dams Using Soil-emulsion Mix</b> .....	520
<i>E. C. Jacintho, M. M. Farias, M. P. Cordão Neto, J. Camapum De Carvalho, R. C. Guimarães</i>	
<b>Geotechnical Characteristics of Primary and Secondary Leach Copper Ore</b> .....	526
<i>J. Campaña, E. Bard, M<sup>a</sup>. E. Anabalón, R. León</i>	

<b>Soil-structure Interaction Analysis Using Finite Element Method. Case of Study: La Cabrera Tunnel and Viaduct</b> .....	532
<i>Z. Arana, L. González, M. Elberg</i>	
<b>Simulation of the Geological Risk Areas in the Costal Strip of the Carabobo State, Venezuela</b> .....	538
<i>G. Sosa, M. Alam, M. Elberg</i>	
<b>Integration of Education, Investigation and Practice Through of Geotechnical Case</b> .....	544
<i>G. Moreno</i>	
<b>Machine Learning for Soil Dynamic Characterization</b> .....	551
<i>E. Rojas-Toledo, S. García-Benítez, E. Ovando-Shelley</i>	
<b>Modelo Constitutivo Para Suelos Granulares Gruesos: Determinación Experimental De Parámetros</b> .....	557
<i>P. A. Arias-García, A. Lizcano</i>	
<b>Some Geotechnical Characteristics of the Tephra in the West of Ecuador</b> .....	563
<i>Desirée Marín- Esteves</i>	
<b>Geotechnical Aspects of the June 23rd 2001 (Mw=8.4) Southern Perú Earthquake</b> .....	569
<i>E. Rondinel-Oviedo, A. Rodríguez-Marek, J. Wartman, J. Zegarra-Pellanne, P. Repetto</i>	
<b>Shrink-swell and Cracking of Sand-bentonite Mixes with EPS Inclusion</b> .....	576
<i>H. K. Illuri, A. Nataatmadja</i>	
<b>Behavior of Plate Tests Bearing on Fiber-reinforced Sand</b> .....	582
<i>M. D. T. Casagrande, N. C. Consoli, A. Thomé</i>	
<b>Engineering Properties of Brazilian Steel Slag for Road Constructions</b> .....	587
<i>K. V. Bicalho, R. R. Castello, C. O. Raposo, M. G. Silva, F. U. Oliveira</i>	
<b>Use of Lime and Fibres in the Improvement of Materials for Use in Structures of Pavements</b> .....	592
<i>P. F. Bento, J. Camapum De Carvalho</i>	
<b>Some Engineering Characteristics of Residual Lateritic Soil Stabilized with Fly Ash and Lime</b> .....	598
<i>Baleshwar Singh, Rajib Kumar Goswami</i>	
<b>Rigid Inclusions in Mexico City Soft Soils</b> .....	602
<i>J. F. Rodríguez, G. Auvinet</i>	
<b>Dynamic Properties of EPS Under Different Confining Stress Conditions</b> .....	610
<i>A. Ossa-López, M. P. Romo</i>	
<b>Geogrid-reinforced Roadway Embankment on Soft Soils: a Case Study</b> .....	617
<i>Reinaldo Vega-Meyer, Roberto Sosa Garrido, Alberto Ramírez Piedrabuena, Ignacio Narezo Larios, Ramón Pico Lapuente</i>	
<b>Soft Ground Improved by Rigid Vertical Piles. Experimental and Numerical Study of the Carrières-sous-poissy (france) Case</b> .....	627
<i>M. A. Nunez, D. Dias, R. Kastner, C. Poilpré</i>	
<b>Construction of a Field of Test for a Unique Curtain of Jet Grouting in the World</b> .....	633
<i>R. Saleh, M. Miceli, R. Luna</i>	
<b>Laboratory and Field Investigation of Land Subsidence Under Cyclic Load</b> .....	642
<i>M. M. Toufigh, A. Ouria</i>	
<b>Laboratory Deep Soil Mixing Protocol for Stabilizing Expansive Soils</b> .....	649
<i>V. Bhadriraju, A. J. Puppala, R. S. Madhyannapu, R. Williammee</i>	



<b>Jet Grouting Solutions for Caracas Subway Line 4 – Challenges in Urban Projects</b> .....	655
<i>G. Guatteri, A. Koshima, A. Ravaglia, M. Duarte</i>	
<b>Recycled Aggregate of Construction and Demolition Waste in Base and Subbase of Pavements in São Paulo - Brazil: Case Study</b> .....	661
<i>L. L. B. Bernucci, F. C. Leite, R. S. Motta, M. R. Abdou</i>	
<b>Influence of the Disturbed Zone on Consolidation Aided by Prefabricated Vertical Drains</b> .....	666
<i>P. Basu, D. Basu, M. Prezzi, A. V. D. Bica</i>	
<b>A Simple Procedure for the Determination of the Shear Strength Envelope of Unsaturated Soils: Experimental Results and Numerical Validation</b> .....	672
<i>Y. Valencia, M. Santos, J. Camapum De Carvalho, M. Farias, G. Gitirana Jr.</i>	
<b>Local and Global Measurement of Strains in Triaxial Cell: Influence of Soil Conditions</b> .....	678
<i>J. Capdevila, V. Rinaldi</i>	
<b>Identification, Classification and Evaluation of Soil Collapsibility by Ménard Pressuremete</b> .....	686
<i>K. C. A. Dourado, R. Q. Coutinho</i>	
<b>Unconfined Compression Tests with Suction Control Using the Osmotic and Axis Translation Technique</b> .....	693
<i>M. A. Alfaro Soto, O. M. Vilar</i>	
<b>Filter Paper Method of Soil Suction Measurement</b> .....	699
<i>K. V. Bicalho, A. Gomes Correia, S. Ferreira, J-M Fleureau, F. A. M. Marinho</i>	
<b>Cross-hole and SCPT Tests in a Tropical Soil from Campinas-SP, Brazil</b> .....	704
<i>H. L. Giacheti, A. S. P. Peixoto, G. De Mío</i>	
<b>Helical Probe Test in Tropical Sandy Soil: Preliminary Results</b> .....	711
<i>A. S. P. Peixoto, F. Pernomian, V. B. Antenor, H. L. Giacheti</i>	
<b>Laboratory Verification of Gas Hydrate-sediment Response</b> .....	718
<i>J. L. H. Grozic, T. J. Kvalstad</i>	
<b>Characterization of a Layered Soil Model in Centrifuge Using Spectral Techniques</b> .....	724
<i>C. Murillo, B. Caicedo, L. Thorel, J. Garnier</i>	
<b>Strain Rate and Overconsolidation Ratio Effect in a México City Clay</b> .....	731
<i>R. Rivera-Constantino, E. Juárez-Badillo, J. L. López-Carbajal</i>	
<b>Shaking Table Determination of Sliding–friction Time Histories at Interfaces</b> .....	739
<i>Bogart Méndez, Eduardo Botero, Juliana Zapata, Miguel Romo</i>	
<b>Uncertainty of Measurement in Soil Mechanics Test</b> .....	744
<i>H. Delgado, I. Martínez</i>	
<b>Prediction of Moisture and Stress Effects on Resilient Modulus Using Soil Suction Concept</b> .....	751
<i>Robert Y. Liang, Samer Rabab'Ah</i>	
<b>Evaluation of Enhanced Integrated Climatic Model Predictions Over Different Permeable Base Materials</b> .....	757
<i>Robert Y. Liang, Samer Rabab'Ah, Madhar Taamneh</i>	
<b>The Role of the Seismic Refraction Prospecting in the Geotechnical Design</b> .....	763
<i>R. Di Francesco, M. Siena, R. M. Di Francesco T</i>	

<b>Use of Inverse Analysis on in Situ Measurements During the Construction of the Bois De Peu Tunnel (france)</b> .....	769
<i>S. Eclaircy-Caudron, D. Dias, R. Kastner</i>	
<b>Correlation Between the Geotechnical Parameters of the Static Cone Penetrometer (CPT) and the Flat Dilatometer of Marchetti (DMT)</b> .....	775
<i>M. Tapia G, M. A. Tapia U.</i>	
<b>Exploración Geotécnica - Geofísica Del Subsuelo Y Modelado Dinámico De Suelos En La Cuenca Sedimentaria De Caracas</b> .....	783
<i>M. González , M. Tagliaferro , M. Schmitz , A. Hernández , Y. Flores, J. Hernández, E. Parra, A. Pérez</i>	
<b>9-m Column Testing of Colloidal Silica Transport Through Porous Media</b> .....	788
<i>Y. Lin, P. M. Gallagher</i>	
<b>Variables That Affects Fluorescents Tracers Used in Hydrogeologist Studies</b> .....	794
<i>J. Carrillo, M. Uzcáteguí. S, Hernández. G. Vivas</i>	
<b>Soil Air Voids Method for Geoconstruction Compaction Control</b> .....	800
<i>R. L. Mokwa</i>	
<b>Comparison of Two Reconsolidation Methods for Mitigating Sample Disturbance in a Natural Clay</b> .....	806
<i>Tanay Karademir, Thomas C. Sheahan</i>	
<b>The PANDA Penetrometer: a New Alternative for the Compaction Control of Tailing Dams</b> .....	812
<i>Espinace, R. Palma, J. Peña, A., Villavicencio, G., Bossier, D. Bacconnet, C, Gourvés, R.</i>	
<b>Protection of Railway-lines Against Natural Hazards</b> .....	818
<i>P. Schwizer, M. Denk, R. De Stefano, G. Marcacci</i>	
<b>Behavior of Coarse Alluvium Slopes Subjected to Earthquakes</b> .....	824
<i>E. Núñez.</i>	
<b>The Empirical Methods for Stability Analysis in Total Tensions for Embankments on Soft Soils</b> .....	830
<i>Roberto Quental Coutinho, Maria Isabela Marques Da Cunha V. Bello</i>	
<b>Geotechnical Behaviour of Shales at the Colombian Andes</b> .....	836
<i>J. Montero-olarte, M. C. Torres-suárez</i>	
<b>Probabilistic Estimation of Vulnerability to Landslides</b> .....	844
<i>M. Uzielli, S. Lacasse</i>	
<b>The Influence of the Unsupported Length in Face Stability</b> .....	850
<i>A. Costa, A. Silva Cardoso, J. Almeida E Sousa</i>	
<b>Response of the Vallcebre Landslide to Rainfall Events</b> .....	856
<i>D. A. González, A. Ledesma, J. Corominas, J. Moya</i>	
<b>Wall Installation Effects of Excavation Support Systems</b> .....	862
<i>L. S. Bryson, D. G. Zapata-Medina</i>	
<b>Continuous Concrete Cut-off Excavated with Hydromill</b> .....	868
<i>Colombo Biserna, Piero Sembenelli, Rubén E. Luna</i>	
<b>Statistical Summary of Rock Mass Characterization from Tunnels of the Caracas-tuy Medio Railroad Project</b> .....	877
<i>M. Truzman</i>	
<b>Soil Nail Walls in the Slope Stabilization</b> .....	883
<i>M. Tapia G, M. A. Tapia U</i>	

<b>The Mechanism of Soil Arching in Drilled Shafts for Slope Stabilization</b> .....	889
<i>M. Tapia</i>	
<b>Methodology for the Primary Evaluation of Slopes of Cut in Soils</b> .....	896
<i>F. Manuel, Q. Brito</i>	
<b>Use of Micropiles for Slope Stabilization</b> .....	906
<i>C. M. Englert, J. E. Gómez , H. D. Robinson</i>	
<b>Determination of the Most Probable Slip Surface in 3D Slopes Using Non-linear Programming Techniques</b> .....	912
<i>M. M. Toufigh, A. R. Ahangarar, A. Ouria</i>	
<b>Excavation of Basements in Coarse-grained Soils Using the Observational Method</b> .....	918
<i>A. Carrillo Gil, E. Carrillo D., O. Donayre C., I. Vera A.</i>	
<b>Relationship of Inferred Soil Behavior to Excavation Instrumentation</b> .....	926
<i>C. Marulanda, Y. M. A. Hashash</i>	
<b>Qualitative Determination of Geological Risks with Analysis of Geomorphologic Settings Asociated to Landslides Inside Middle Basin of Chama River. Mérida State, Venezuela</b> .....	933
<i>O. Ávila, M. Morales, O. Guerrero</i>	
<b>Efectos De Arqueamiento En Un Terraplén Sobre Suelo Piloteado Por Medio De Análisis Numéricos Bidimensionales y Tridimensionales</b> .....	939
<i>Sandra Patricia Echeverría Fernández, Márcio Muniz De Farias</i>	
<b>Plan of Risk Reduction of Erosion / Landslide in an Area of Camaragibe City /Pernambuco</b> .....	944
<i>Ana Patrícia N. Bandeira, Roberto Q. Coutinho, Margareth M. Alheiros, Alexandre Duarte Gusmão</i>	
<b>Stability of a Concave Slope Considering 3D Conditions</b> .....	950
<i>J. Camapum De Carvalho, Y. Valencia, M. Santos, G. F. N. Gitirana Jr.</i>	
<b>Three-dimensional Analysis of Concrete Faced Rockfill Dams</b> .....	956
<i>A. Frutuoso, A. Assis, M. Farias, M. Cordão Neto B.</i>	
<b>Influence of the Local Effects in the Seismic Answer of Vertical Structures Using Geomechanic Simulation</b> .....	961
<i>M. Elberg, R. Torres, E. Infante</i>	
<b>Determination of Probability of Failure in Slope Rock Masses Considering Plane Rupture</b> .....	968
<i>Roberto Ucar Navarro</i>	
<b>Research and Development on Flexible Debris Flow Barriers</b> .....	976
<i>P. Schwizer, M. Denk, R. De Stefano, G. Marcacci</i>	
<b>Panama Chanel Upgrade Program</b> .....	N/A
<i>Maximiliano De Puy</i>	
<b>Argentinian Reglament for Geotechnical Studies (Under Revision)</b> .....	N/A
<i>Roberto Terzariol</i>	
<b>Special Lecture:</b> .....	N/A
<i>Rolando Armas</i>	
<b>Landslides Risk Management in Urban Area</b> .....	N/A
<i>Roberto Coutinho</i>	

**Influence of an Alkaline Fluid on Physical-chemical-mineralogical Characteristics  
and on Shear Strength in a Colluvium Soil from Poços De Caldas-Mg-brazil.....** N/A  
*Táise Monique De Oliveira Carvalho, Tácio Mauro P. De Campos, Mónica Priscilla  
Hernandez Moncada, Franklin Dos Santos Antunes*

**Author Index**