

Geotechnical Frontiers 2017

Seismic Performance and Liquefaction

Selected Papers from Sessions of Geotechnical Frontiers 2017

Geotechnical Special Publication Number 281

Orlando, Florida, USA
12 – 15 March 2017

Editors:

Thomas L. Brandon
Richard J. Valentine

ISBN: 978-1-5108-3952-6

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© (2017) by American Society of Civil Engineers
All rights reserved.

Printed by Curran Associates, Inc. (2017)

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

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

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: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Contents

Seismic Parameters

What Can We Learn from Kappa (κ) to Achieve a Better Characterization of Damping in Geotechnical Site Response Models?	1
Ashly Cabas and Adrian Rodriguez-Marek	
Damping and Shear Moduli of Laboratory-Prepared Mineral Mixtures	10
Beena Ajmera and Binod Tiwari	
Use of Pore Pressure Response to Determine Shear Strength Degradation from Cyclic Loading	19
Beena Ajmera, Binod Tiwari, and Pavitra Pandey	
Parametric Study on the Effectiveness of Deep-Soil Mixed Soil-Reinforcement Panels on Seismic De-Amplification at Soft Clay Sites	27
Prakash Khanal, Binod Tiwari, Beena Ajmera, Michael Mann, and Murtdha Al Quraishi	
Centrifuge Modeling and Analysis of Soil Structure Interaction under Biaxial Dynamic Excitations	37
Omar El Shafee, Tarek Abdoun, and Mourad Zeghal	
A Relationship between Modulus and Damping Provides for Simple, Unified Modeling of Both	48
Vincent P. Drnevich	
Numerical Modelling of the Dynamic Behavior of Unsaturated Soils, Including Hydraulic Hysteresis	61
Bo Zhang and Kanthasamy K. Muraleetharan	
Constant-Volume Cyclic Testing to Determine Input Parameters for the GMP Pore Pressure Generation Model	71
Carmine P. Polito	
Measurement of Damping in Soils by the Resonant Column Test.....	80
Vincent P. Drnevich and Jeremy C. Ashlock	
Estimation of Shear Wave Velocity in Centrifuge Models	92
Waleed El-Sekelly, Tarek Abdoun, and Vicente Mercado	

Modulus Reduction and Damping Curves for Landfill Covers	101
Neven Matasovic and Dimitrios Zekkos	
Post-Cyclic Recompression of Clays Subjected to Undrained Cyclic Shear	109
Tran T. Nhan and Hiroshi Matsuda	
Free-Field Cyclic Response of Dense Sands in Dynamic Centrifuge Tests with 1D and 2D Shaking.....	121
Alfonso Cerna-Diaz, Scott M. Olson, Ozgun A. Numanoglu, Youssef M. A. Hashash, Lopamudra Bhaumik, Cassandra J. Rutherford, and Thomas Weaver	
A Framework for Evaluating the Effects of Drained Cyclic Preshearing on the Liquefaction Resistance of Ottawa Sand	131
Erin L. D. Sibley, Scott M. Olson, and Carmine P. Polito	
Site Classification of the Strong Motion Stations of Uttarakhand, India, Based on the Model Horizontal to Vertical Spectral Ratio.....	141
N. H. Harinarayan and Abhishek Kumar	
Volumetric Strain in Non-Plastic Silty Sand Subject to Multidirectional Cyclic Loading	150
Lopamudra Bhaumik, Cassandra J. Rutherford, Alfonso Cerna-Diaz, Scott M. Olson, Ozgun A. Numanoglu, Youssef M. A. Hashash, and Thomas Weaver	
Linear and Nonlinear Shear Moduli of Materials Associated with Heap Leach-Pad Mining	160
A. K. Keene, H. Jaffal, K. H. Stokoe, C. S. El Mohtar, A. Reyes, R. Ayala, and D. Parra	
Topography Effects Are Not Dominated by Ground Surface Geometry: A Site Effects Paradox.....	171
K. Mohammadi and D. Asimaki	
Effect of Sudden Shear Wave Velocity Contrast at Shallow Layer Interfaces on the Seismic Site Response for Charleston, SC	182
Md. Ariful H. Bhuiyan, Nadarajah Ravichandran, Ronald D. Andrus, and Shimelies A. Aboye	
Site-Specific Dynamic Analysis: 1-D versus 2-D.....	192
Jianchao Li and Bashar S. Qubain	

Weathered Zone Effects: Central and Eastern North American Site Response	205
Morgan A. Eddy, C. Guney Olgun, Adrian Rodriguez-Marek, and Martin C. Chapman	

Metrics for the Comparison of Acceleration Time Histories.....	215
Nithyagopal Goswami, Mourad Zeghal, Majid Manzari, and Bruce Kutter	

Soil Liquefaction

Influence of Soil and Structural Properties on the Response of Shallow-Founded Structures on Layered Liquefiable Deposits.....	225
Zana Karimi, Shideh Dashti, and Zach Bullock	

Verification of Random Field-Based Liquefaction Mapping Using a Synthetic Digital Soil Field.....	236
Qiushi Chen, Mengfen Shen, Chaofeng Wang, and C. Hsein Juang	

Monotonic, Cyclic, and Post-Cyclic Shear Response of a Gravelly Sand.....	246
Jonathan F. Hubler, Adda Athanasopoulos-Zekkos, and Dimitrios Zekkos	

Evaluation of Liquefaction-Induced Lateral Spreading Procedures for Interbedded Deposits: Çark Canal in the 1999 M7.5 Kocaeli Earthquake.....	254
Sean K. Munter, Ross W. Boulanger, Christopher P. Krage, and Jason T. DeJong	

Prediction of Lateral Spreading Displacement on Gently Sloping Liquefiable Ground	267
Omid Ghasemi-Fare and Ali Pak	

Analysis of Liquefaction at a Bridge Site in the 2014 Napa Earthquake	277
Kathleen M. Darby, Martin W. McIlroy, Ross W. Boulanger, and Jason T. DeJong	

Shearing and Hydraulic Behavior of MICP Treated Silty Sand.....	290
Atefeh Zamani and Brina M. Montoya	

Study of Electromagnetic-Induced Liquefaction Mitigation and Alteration of the Hydraulic Conductivity of Coarse-Grained Soils.....	300
Rakesh Acharya and Arvin Farid	

Modeling the Response of a Pleistocene Sand during In Situ Liquefaction Testing.....	309
Michael P. Esposito III, Ronald Andrus, and Nadarajah Ravichandran	

Numerical Modeling for Soil Liquefaction

Calibration of the PM4Sand Model for Sands with Substantial Amounts of Fines	321
Bret N. Lingwall	
Seismic Performance of a Layered Liquefiable Site: Validation of Numerical Simulations Using Centrifuge Modeling.....	332
Jenny Ramirez, Mahir Badanagki, Morteza Rahimi Abkenar, Mohamed A. ElGhoraiby, Majid T. Manzari, Shideh Dashti, Andres Barrero, Mahdi Taiebat, Katerina Ziotopoulou, and Abbie Liel	
Seismic Response of Liquefiable Sloping Ground: Validation of Class B Predictions against the LEAP Centrifuge Tests	342
Levi T. Ekstrom and Katerina Ziotopoulou	
Evaluation of a Simplified Soil Constitutive Model Considering the Implied Strength and Porewater Pressure Generation for 1-D Seismic Site Response	352
Xuan Mei, Scott M. Olson, and Youssef M. A. Hashash	
Microscale Modeling of Soil Liquefaction under Multidirectional Shaking.....	361
Usama El Shamy and Yasser Abdelhamid	
Liquefaction Analyses of the Port of Long Beach Using the UBC3D-PLM Constitutive Soil Model.....	369
Luis G. Arboleda-Monsalve, Jaime A. Mercado, Andrew Sover, and David G. Zapata-Medina	
Nonlinear 3-D Modeling of Dense Sand and the Simulation of a Soil-Structure System under Multi-Directional Loading	379
Ozgun A. Numanoglu, Youssef M. A. Hashash, Alfonso Cerna-Diaz, Scott M. Olson, Lopamudra Bhaumik, Cassandra J. Rutherford, and Thomas Weaver	
Comparison of Liquefaction Constitutive Models for a Hypothetical Sand	389
Trevor J. Carey and Bruce L. Kutter	
Energy Dissipation in Soil Structures during Uniform Cyclic Loading	399
C. Guney Olgun and Soheil Kamalzare	