

GEOTECHNICAL SPECIAL PUBLICATION NO. 181

GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS IV

PROCEEDINGS OF THE CONFERENCE

May 18–22, 2008
Sacramento, California

SPONSORED BY
The Geo-Institute of the American Society of Civil Engineers

EDITED BY
David Zeng
Majid T. Manzari
Dennis R. Hiltunen



Published by the American Society of Civil Engineers



This is a preview. [Click here to purchase the full publication.](#)

GEOTECHNICAL SPECIAL PUBLICATION NO. 181

GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS IV

PROCEEDINGS OF THE CONFERENCE

May 18–22, 2008
Sacramento, California

SPONSORED BY
The Geo-Institute of the American Society of Civil Engineers

EDITED BY
David Zeng
Majid T. Manzari
Dennis R. Hiltunen



Published by the American Society of Civil Engineers



This is a preview. [Click here to purchase the full publication.](#)

Copyright and Disclaimer

ISBN: 978-0-7844-0975-6

Any statements expressed in these materials are those of the individual authors and do not necessarily represent the views of ASCE, which takes no responsibility for any statement made herein. No reference made in this publication to any specific method, product, process or service constitutes or implies an endorsement, recommendation, or warranty thereof by ASCE. The materials are for general information only and do not represent a standard of ASCE, nor are they intended as a reference in purchase specifications, contracts, regulations, statutes, or any other legal document.

ASCE makes no representation or warranty of any kind, whether express or implied, concerning the accuracy, completeness, suitability, or utility of any information, apparatus, product, or process discussed in this publication, and assumes no liability therefore. This information should not be used without first securing competent advice with respect to its suitability for any general or specific application. Anyone utilizing this information assumes all liability arising from such use, including but not limited to infringement of any patent or patents.

Copyright © 2008 by the American Society of Civil Engineers.
All Rights Reserved.

ASCE and American Society of Civil Engineers—Registered in U.S. Patent and Trademark Office.

Photocopies and reprints.

You can obtain instant permission to photocopy ASCE publications by using ASCE's online permission service (www.pubs.asce.org/authors/RightslinkWelcomePage.html). Requests for 100 copies or more should be submitted to the Reprints Department, Publications Division, ASCE, (address above); email: permissions@asce.org. A reprint order form can be found at www.pubs.asce.org/authors/reprints.html.

American Society of Civil Engineers
ASCE International Headquarters
1801 Alexander Bell Drive
Reston, VA 20191-4400 USA

Call Toll-Free in the U.S.: 1-800-548-2723 (ASCE)
Call from anywhere in the world: 1-703-295-6300
Internet: <http://www.pubs.asce.org>

Preface

The papers contained in this publication were prepared for presentation in GEESD IV, the 4th decennial Geotechnical Earthquake Engineering and Soil Dynamics Conference organized by the EESD Committee of the ASCE Geo-Institute. GEESD IV follows the highly successful GEESD conferences in Seattle, Washington (1998); Park City, Utah (1988); and Pasadena, California (1978). The conference covers a broad field of topics in soil dynamics and geotechnical earthquake engineering, including engineering seismology, dynamic material properties, geophysical methods, SASW benchmarking, site response, liquefaction, ground improvement, embankment dams, tailings dams, landfills, levees, lifelines and networks, mapping and zoning, NEESR research, numerical modeling, piers and wharves, retaining structures, foundation dynamics, soil-structure interaction, stability of natural slopes, and surface fault rupture.

The organizing committee invited nine outstanding keynote speakers and ten theme lecturers to present papers on developments in important areas of geotechnical earthquake engineering. The committee reviewed over 400 abstracts and 260 papers. The papers received undergo a peer review before being accepted. The standards for the peer review followed those required for ASCE Geotechnical Special Publications. Each paper must receive two positive reviews to be accepted and must be revised to conform to the mandatory revisions of the reviewers. Due to a tight schedule, there was not enough time for more than one cycle of review and revision. In the end, 234 papers were accepted for publication. All the papers are eligible for discussion in the ASCE Journal of Geotechnical and Geoenvironmental Engineering and for ASCE awards.

The paper review would have been impossible without the help of a group of lead reviewers, who, on behalf of the Proceedings and Publications Committee, organized and in some cases conducted the review of a group of papers. The editors would like to acknowledge the invaluable contribution of the following lead reviewers:

Pedro Arduino	Dominic Assimaki	Ariyaputhirar Balakrishnan
Scott Brandenburg	Mandar Dewoolkar	Ali Eliadorani
William Frasier	Russell Green	Yousef Hashash
Laureano Hoyos	Tom Holzer	Boris Jeremic
Amir Kaynia	Mike Kalinski	James N. Lee
Xiang-Song Li	Jeen-Sheng Lin	Hoe I. Ling
Gopal Madabhushi	N. Matasovic	Jorge Meneses
George Mylonakis	Soheil Nazarian	Ronald Pak
Adrian Rodriguez-Marek	Ellen Rathje	Kyle Rollins
Brent Rosenblad	Raj Siddharthan	Mike Sharp
Usama. El Shamy	Mingjian Tao	Thusyanthan
Joseph Wartman	Yu-Hsing Wang	Jerry Wu
Liping Yan	Bill Yu	Mourad Zeghal
E. Zhai		

The lead reviewers were helped by the following highly qualified reviewers in the review process:

F. Abedzadeh	Bashar Alramahi	Jorge Alva
Carlos Amante	Donald Anderson	Scott Anderson
Ralph Archuleta	Pedro Arduino	Richie Armstrong
Rajendram Arulnathan	Dominic Assimaki	Adda Athanasopoulos
George Athanasopoulos	Laurie Baise	Jack Baker
Ariya Balakrishnan	Paola Bandini	Steven F. Bartlett
James Bay	Michael Beaty	Victoria Bennet
Jon Bischoff	Antonio Bobet	Fabian Bonilla
David M. Boore	Ross Boulanger	Aaron Bradshaw
Scott J. Brandenburg	Andrew Brennan	Peter M. Byrne
Billy Camp	Antonio Carraro	Gonzalo Castro
Kemal Önder Çetin	C. Yoga Chandran	Nien Chang
Qimin Chen	Xin Chen	Deepankar Choudhury
Daniel B. Chu	Ulas Cilingir	Ryan Cole
Brady Cox	Karina Dahl	Panos Dakoulas
Craig A. Davis	Anirban De	Christopher M. Dietel
Jeffrey S. Dingrando	Jiwei Duan	Cedric Fairbanks
Allison Faris	Americo Fernandez	Jon B. P. Fletcher
Keyvan Fotoohi	Mahmoud El Gamal	Louis Ge
M. Ghannad	James Gingery	Eric Gottheld
Robert Goughnour	Vladimir Grazier	Russell Green
Brian Greene	Nenad Gucunski	Simon Gudina
Kate Gunberg	Marte Gutierrez	B.B. Guzina
Tarik Hadj-Hamou	Stuart Haigh	Curt Haselton
Youssef Hashash	Chunmei He	Greg Hempen
Bruce Hilton	Sahadat Hossain	Jeffery Howard
Laureano Hoyos	Roman Hryciw	Jianping Hu
Mahadevan Ilankatharan	Allen Jones	Shawn O. Jones
Hsein Juang	Michael Kalinski	Ronnie Kamai
Thangalingam Kanagalingam	Pirooz Kashighandi	Dong-Soo Kim
Stephanie A. King	Tadahiro Kishida	Alexander Kozak
Ramachandran Kulasingam	Dominik Lang	Hubert Law
Christian Ledezma	Jong-Sub Lee	Anne Lemnitzer
X.S. Li	Chi-Tseng Ted Liu	Gang Liu
Nina Liu	Yan Liu	Thomas Lok
Barbara Luke	Alan J. Luttenegger	B.K. Maheshwari
Nicolas Malasavage	Erik Malvick	Geoffrey R. Martin
Neven Matasovic	John McCartney	Nason McCullough
Claudia Medina	Jorge Meneses	Paul Michaels
H.Y. Ming	Robb E. Moss	Charles S. Mueller
Kanthasamy K. Muraleetharan	George Mylonakis	Erik J. Newman
Erfan Nezami	Guney Olgun	Rolando Orense
Ronald Pak	Aasha Pancha	Miguel Pando
Achilleas Papadimitriou	Aris Papadopoulos	Duhee Park

Richard Pearce	Michael Pender	Zhigang Peng
Arben Pitarka	Dimitrios Pitolakis	Carmine Polito
Anand Puppala	Tong Qiu	Alan Rauch
N. (Ravi) Ravichandran	Michael Reichle	Glenn Rix
Adrian Rodriguez-Marek	Stefan Romanoschi	Brent Rosenblad
Dario Rosidi	David Saftner	Pijush Samui
Rodolfo B. Sancio	Marika Santagata	Sireesh Saride
Hassan Sedarat	Hope A. Seligman	Kallol Sett
Anastasios Sextos	Anoosh Shamsabadi	Usama El Shamy
Lisheng Shao	Thevachandran Shenthan	Parisa Shokouhi
Francisco Silva-Tulla	Siva Sivathayalan	Darin Sjoblom
Shin-Tai Song	Alan Stadler	Konstantin Stamatopoulos
William J Stephenson	Patrick Strenk	D. Su
Luis Suez	Erwin Supranata	Ertugrul Taciroglu
Mahdi Taiebat	Payman Kahili Tehrani	Eric Thompson
Salih Tileylioglu	John C. Tinsley, III	Binod Tiwari
Andrew Tolleson	Aurel Trandafir	Thaleia Travasarou
Chi-Chin Tsai	Wen Tseng	Javier Ubilla
Roberto Vasallo	Christos Vrettos	Judith Wang
Jui-pin Wang	Yu-Hsing Wang	Joseph Wartman
Lei Wei	Daniel Whang	David White
Dharma Wijewickreme	Robert A Williams	Chris J. Wills
Ching-Liu Wu	Min-hao Wu	Horng-Jyh Yang
J. Yang	Zhaohui Yang	Sungmin Yoon
Xinbao Yu	Xiong (Bill) Yu	Zia Zafir
Dimitris Zekkos	Aspa Zerva	Jinxing Zha
Feng Zhang	Jian Zhang	Jie Zhang

The editors would like to thank the conference chairman, Ross Boulanger, for his tireless efforts and invaluable contribution. Also, we would like to acknowledge the significant assistance by Ms. Sheana Singletary, Program Administrator of ASCE Conference and Meetings Services.

Finally, we would like to express our sincere appreciation to all the authors for their significant contributions to the success of the conference.

Xiangwu (David) Zeng
Case Western Reserve University

Majid Manzari
George Washington University

Dennis Hiltunen
University of Florida

Geotechnical Special Publications

- | | |
|--|---|
| 1 <i>Terzaghi Lectures</i> | 48 <i>Soil Suction Applications in Geotechnical Engineering</i> |
| 2 <i>Geotechnical Aspects of Stiff and Hard Clays</i> | 49 <i>Soil Improvement for Earthquake Hazard Mitigation</i> |
| 3 <i>Landslide Dams: Processes, Risk, and Mitigation</i> | 50 <i>Foundation Upgrading and Repair for Infrastructure Improvement</i> |
| 7 <i>Timber Bulkheads</i> | 51 <i>Performance of Deep Foundations under Seismic Loading</i> |
| 9 <i>Foundations & Excavations in Decomposed Rock of the Piedmont Province</i> | 52 <i>Landslides under Static and Dynamic Conditions</i> Analysis, Monitoring, and Mitigation |
| 11 <i>Dynamic Response of Pile Foundations</i> Experiment, Analysis and Observation | 53 <i>Landfill Closures</i> Environmental Protection and Land Recovery |
| 14 <i>Geotechnical Aspects of Karst Terrains</i> | 54 <i>Earthquake Design and Performance of Solid Waste Landfills</i> |
| 15 <i>Measured Performance Shallow Foundations</i> | 55 <i>Earthquake-Induced Movements and Seismic Remediation of Existing Foundations and Abutments</i> |
| 16 <i>Special Topics in Foundations</i> | 56 <i>Static and Dynamic Properties of Gravelly Soils</i> |
| 17 <i>Soil Properties Evaluation from Centrifugal Models</i> | 57 <i>Verification of Geotechnical Grouting</i> |
| 18 <i>Geosynthetics for Soil Improvement</i> | 58 <i>Uncertainty in the Geologic Environment</i> |
| 19 <i>Mine Induced Subsidence: Effects on Engineered Structures</i> | 59 <i>Engineered Contaminated Soils and Interaction of Soil Geomembranes</i> |
| 21 <i>Hydraulic Fill Structures</i> | 60 <i>Analysis and Design of Retaining Structures Against Earthquakes</i> |
| 22 <i>Foundation Engineering</i> | 61 <i>Measuring and Modeling Time Dependent Soil Behavior</i> |
| 23 <i>Predicted and Observed Axial Behavior of Piles</i> | 62 <i>Case Histories of Geophysics Applied to Civil Engineering and Public Policy</i> |
| 24 <i>Resilient Moduli of Soils: Laboratory Conditions</i> | 63 <i>Design with Residual Materials: Geotechnical and Construction Considerations</i> |
| 25 <i>Design and Performance of Earth Retaining Structures</i> | 64 <i>Observation and Modeling in Numerical Analysis and Model Tests in Dynamic Soil-Structure Interaction Problems</i> |
| 27 <i>Geotechnical Engineering Congress</i> | 65 <i>Dredging and Management of Dredged Material</i> |
| 28 <i>Detection of and Construction at the Soil/Rock Interface</i> | 66 <i>Grouting: Compaction, Remediation and Testing</i> |
| 29 <i>Recent Advances in Instrumentation, Data Acquisition and Testing in Soil Dynamics</i> | 67 <i>Spatial Analysis in Soil Dynamics and Earthquake Engineering</i> |
| 32 <i>Embankment of Dams</i> James L. Sherard Contributions | 68 <i>Unsaturated Soil Engineering Practice</i> |
| 33 <i>Excavation and Support for the Urban Infrastructure</i> | 69 <i>Ground Improvement, Ground Reinforcement, Ground Treatment: Developments 1987-1997</i> |
| 34 <i>Piles Under Dynamic Loads</i> | 70 <i>Seismic Analysis and Design for Soil-Pile-Structure Interactions</i> |
| 35 <i>Geotechnical Practice in Dam Rehabilitation</i> | 71 <i>In Situ Remediation of the Geoenvironment</i> |
| 37 <i>Advances in Site Characterization: Data Acquisition, Data Management and Data Interpretation</i> | 72 <i>Degradation of Natural Building Stone</i> |
| 39 <i>Unsaturated Soils</i> | 73 <i>Innovative Design and Construction for Foundations and Substructures Subject to Freezing and Frost</i> |
| 40 <i>Vertical and Horizontal Deformations of Foundations and Embankments</i> | |
| 41 <i>Predicted and Measured Behavior of Five Spread Footings on Sand</i> | |
| 42 <i>Serviceability of Earth Retaining Structures</i> | |
| 43 <i>Fracture Mechanics Applied to Geotechnical Engineering</i> | |
| 44 <i>Ground Failures Under Seismic Conditions</i> | |
| 45 <i>In Situ Deep Soil Improvement</i> | |
| 46 <i>Geoenvironment 2000</i> | |
| 47 <i>Geo-Environmental Issues Facing the Americas</i> | |

- 74 *Guidelines of Engineering Practice for Braced and Tied-Back Excavations*
- 75 *Geotechnical Earthquake Engineering and Soil Dynamics III*
- 76 *Geosynthetics in Foundation Reinforcement and Erosion Control Systems*
- 77 *Stability of Natural Slopes in the Coastal Plain*
- 78 *Filtration and Drainage in Geotechnical/Geoenvironmental Engineering*
- 79 *Recycled Materials in Geotechnical Applications*
- 80 *Grouts and Grouting: A Potpourri of Projects*
- 81 *Soil Improvement for Big Digs*
- 82 *Risk-Based Corrective Action and Brownfields Restorations*
- 83 *Design and Construction of Earth Retaining Systems*
- 84 *Effects of Construction on Structures*
- 85 *Application of Geotechnical Principles in Pavement Engineering*
- 86 *Big Digs Around the World*
- 87 *Jacked Tunnel Design and Construction*
- 88 *Analysis, Design, Construction, and Testing of Deep Foundations*
- 89 *Recent Advances in the Characterization of Transportation Geo-Materials*
- 90 *Geo-Engineering for Underground Facilities*
- 91 *Special Geotechnical Testing: Central Artery/Tunnel Project in Boston, Massachusetts*
- 94 *Performance Confirmation of Constructed Geotechnical Facilities*
- 95 *Soil-Cement and Other Construction Practices in Geotechnical Engineering*
- 96 *Numerical Methods in Geotechnical Engineering: Recent Developments*
- 97 *Innovations and Applications in Geotechnical Site Characterization*
- 98 *Pavement Subgrade, Unbound Materials, and Nondestructive Testing*
- 99 *Advances in Unsaturated Geotechnics*
- 100 *New Technological and Design Developments in Deep Foundations*
- 101 *Slope Stability 2000*
- 102 *Trends in Rock Mechanics*
- 103 *Advances in Transportation and Geoenvironmental Systems Using Geosynthetics*
- 104 *Advances in Grouting and Ground Modification*
- 105 *Environmental Geotechnics*
- 106 *Geotechnical Measurements: Lab & Field*
- 107 *Soil Dynamics and Liquefaction 2000*
- 108 *Use of Geophysical Methods in Construction*
- 109 *Educational Issues in Geotechnical Engineering*
- 110 *Computer Simulation of Earthquake Effects*
- 111 *Judgment and Innovation: The Heritage and Future of the Geotechnical Engineering Profession*
- 112 *Soft Ground Technology*
- 114 *Soils Magic*
- 115 *Expansive Clay Soils and Vegetative Influence on Shallow Foundations*
- 116 *Deep Foundations 2002: An International Perspective on Theory, Design, Construction, and Performance*
- 117 *Discrete Element Methods: Numerical Modeling of Discontinua*
- 118 *A History of Progress: Selected U.S. Papers in Geotechnical Engineering*
- 119 *Soil Behavior and Soft Ground Construction*
- 120 *Grouting and Ground Treatment*
- 121 *Probabilistic Site Characterization at the National Geotechnical Experimentation Sites*
- 122 *Sinkholes and the Engineering and Environmental Impacts of Karst*
- 123 *Recent Advances in Materials Characterization and Modeling of Pavement Systems*
- 124 *GeoSupport 2004: Drilled Shafts, Micropiling, Deep Mixing, Remedial and Specialty Foundation Systems*
- 125 *Current Practices and Future Trends in Deep Foundations*
- 126 *Geotechnical Engineering for Transportation Projects*
- 127 *Recycled Materials in Geotechnics*
- 128 *Soil Constitutive Models: Evaluation, Selection, and Calibration*
- 129 *Advances in Designing and Testing Deep Foundations*
- 130 *Advances in Pavement Engineering*
- 131 *Contemporary Issues in Foundation Engineering*
- 132 *Advances in Deep Foundations: In Memory of Michael W. O'Neill*
- 133 *Earthquake Engineering and Soil Dynamics*
- 134 *Soil Dynamics Symposium in Honor of Professor Richard D. Woods*
- 135 *Erosion of Soils and Scour of Foundations*
- 136 *Innovations in Grouting and Soil Improvement*

- | | |
|--|--|
| <p>137 <i>Legal and Liability Issues in Geotechnical Engineering</i></p> <p>138 <i>Site Characterization and Modeling</i></p> <p>139 <i>Calibration of Constitutive Models</i></p> <p>140 <i>Slopes and Retaining Structures under Seismic and Static Conditions</i></p> <p>141 <i>International Perspectives on Soil Reinforcement Applications</i></p> <p>142 <i>Waste Containment and Remediation</i></p> <p>143 <i>Geomechanics: Testing, Modeling, and Simulation</i></p> <p>144 <i>Sinkholes and the Engineering and Environmental Impacts of Karst</i></p> <p>145 <i>Seismic Performance and Simulation of Pile Foundations in Liquefied and Laterally Spreading Ground</i></p> <p>146 <i>Asphalt Concrete: Simulation, Modeling and Experimental Characterization</i></p> <p>147 <i>Unsaturated Soils 2006</i></p> <p>148 <i>Advances in Unsaturated Soil, Seepage, and Environmental Geotechnics</i></p> <p>149 <i>Site and Geomaterial Characterization</i></p> <p>150 <i>Soil and Rock Behavior and Modeling</i></p> <p>151 <i>Advances in Earth Structures: Research to Practice</i></p> <p>152 <i>Ground Modification and Seismic Mitigation</i></p> <p>153 <i>Foundation Analysis and Design: Innovative Methods</i></p> <p>154 <i>Pavement Mechanics and Performance</i></p> <p>155 <i>Underground Construction and Ground Movement</i></p> <p>156 <i>Geomechanics II: Testing, Modeling, and Simulation</i></p> <p>157 <i>Computer Applications in Geotechnical Engineering</i></p> <p>158 <i>Contemporary Issues in Deep Foundations</i></p> <p>159 <i>Case Studies in Earth Retaining Structures</i></p> <p>160 <i>Dynamic Response and Soil Properties</i></p> <p>161 <i>Embankments, Dams, and Slopes: Lessons from the New Orleans Levee Failures and Other Issues</i></p> <p>162 <i>Problematic Soils and Rocks and In Situ Characterization</i></p> <p>163 <i>Geoenvironmental Engineering</i></p> <p>164 <i>Innovative Applications of Geophysics in Civil Engineering</i></p> <p>165 <i>Geosynthetics in Reinforcement and Hydraulic Applications</i></p> <p>166 <i>Educational Activities in Geotechnical Engineering</i></p> <p>167 <i>Geotechnics of Soil Erosion</i></p> <p>168 <i>Grouting for Ground Improvement: Innovative Concepts and Applications</i></p> <p>169 <i>Soil and Material Inputs for Mechanistic-Empirical Pavement Design</i></p> | <p>170 <i>Probabilistic Applications in Geotechnical Engineering</i></p> <p>171 <i>Advances in Shallow Foundations</i></p> <p>172 <i>Soil Improvement</i></p> <p>173 <i>Advances in Measurement and Modeling of Soil Behavior</i></p> <p>174 <i>Designing Our Underground Space</i></p> <p>175 <i>Field Measurements in Geomechanics 2007</i></p> <p>176 <i>Analysis of Asphalt Pavement Materials and Systems: Emerging Methods</i></p> <p>177 <i>GeoCongress 2008: Geotechnics of Waste Management and Remediation</i></p> <p>178 <i>GeoCongress 2008: Geosustainability and Geohazard Mitigation</i></p> <p>179 <i>GeoCongress 2008: Characterization, Monitoring, and Modeling of GeoSystems</i></p> <p>180 <i>From Research to Practice in Geotechnical Engineering</i></p> |
|--|--|

Ground Motions

Keynote—Nonlinear Seismic Ground Response Analysis: Code Usage Protocols and Verification against Vertical Array Data

Jonathan P. Stewart and Annie O. L. Kwok

Assessment of Ground Motion Selection and Modification (GMSM) Methods for Non-Linear Dynamic Analyses of Structures

Christine A. Goulet, Jennie Watson-Lamprey, Jack Baker, Curt Haselton, and Nico Luco

Identification of Near-Fault Velocity Pulses and Prediction of Resulting Response Spectra

Jack W. Baker

Preliminary Estimation of Seismically Induced Ground Strains from Spatially Variable Ground Motions

Timothy D. Ancheta, Jonathan P. Stewart, Norman A. Abrahamson, and Robert L. Nigbor

Probabilistic Use of Arias Intensity in Geotechnical Earthquake Engineering

J. K. Howard, W. A. Fraser, and M. G. Schultz

Seismic Design Criteria Ground Motions

Joe Litehiser and James E. Marrone

Seismic Hazard Analysis and Probabilistic Ground Motions in the Upper Mississippi Embayment

J. Alfredo Fernandez and Glenn J. Rix

Site Response

A Simplified Constitutive Model to Simultaneously Match Modulus Reduction and Damping Soil Curves for Nonlinear Site Response Analysis

Camilo Phillips and Youssef M. A. Hashash

Basin Effects in the Upper Mississippi Embayment

J. Alfredo Fernandez and Glenn J. Rix

Comparing Weak- and Strong-Motion Spectral Ratios at the Turkey Flat Site Effects Test Area, Parkfield, California: Possible Nonlinear Soil Behavior

Chris H. Cramer

Consequences of Solution Non-Uniqueness in Surface Wave Tests for Seismic Response Studies

Sebastiano Foti, Cesare Comina, Deniele Boiero, and Laura Valentina Socco

Developing Site-Specific Design Response Spectra for a Type F Site Due to Liquefaction

Endi Zhai

Dynamic Response of Unsaturated Non-Collapsible and Collapsible Deposits

Claudia Medina and Mourad Zeghal

Evaluation of Site Response for Deepwater Field

Fabrizio Ardoino, Chiara M. Traverso, and Eric J. Parker

Hysteretic Damping Correction and Its Effect on Non-Linear Site Response Analyses