

STATE OF THE ART RESEARCH IN CIVIL AND MINING ENGINEERING

September 2004

COMPILED BY
DING DEXIN YANG SHIJIAO
ZHANG ZHIJUN

000111207



Central South University Press

土木与采矿工程前沿研究

丁德馨 杨仕教 张志军 编

☐责任编辑 谭 平

☐出版发行 中南大学出版社

社址:长沙市麓山南路 邮编:410083

发行科电话:0731-8876770

传真:0731-8710482

☐经 销 湖南省新华书店

☐印 装 湖南大学印刷厂

☐开 本 787×1092 1/16 ☐印张 15.25 ☐字数 372 千字

☐版 次 2004 年 11 月第 1 版 ☐2004 年 11 月第 1 次印刷

☐书 号 ISBN 7-81061-990-X/TU·016

☐定 价 16.00 元

图书出现印装问题,请与经销商调换

Preface

This textbook was specifically compiled for postgraduate students either for Master Degree or for Phd Degree. It consists of the research projects funded either by the Natural Science Foundation of the United States or by the Engineering and Physical Science Research Council of the United Kingdom. The objectives are to help them to learn about the state of the art research and the new trends in civil and mining engineering, to choose their research topics for their theses for Master Degree or Phd Degree and to improve their written English.

All the materials included in this book fall into the following parts: (1) dynamic problems, (2) theory and techniques for soil reinforcement, (3) theory and techniques for numerical modeling, (4) risk assessment and reliability analysis, (5) theory for soil deformation, (6) measurement systems and techniques, (7) fundamental theory for soils, (8) seepage problems, (9) environmental problems, (10) unsaturated soil mechanics, (11) optimization of structures, (12) nonlinear mechanics, (13) new materials and theories. This classification is not strict since some materials may be put into this part or that one.

It is believed that this textbook will be of great help to the postgraduate students in choosing research topics for their theses and learning about the state of the art research in civil and mining engineering.

CONTENTS

1. Dynamic Problems	(1)
Development of Fragility Curves for Problems in Geotechnical Earthquake Engineering	(1)
Geosynthetic-Reinforced Soil Structures Subject to Strong Earthquake Loading	(2)
Seismic Permanent Displacement of Geosynthetic-Reinforced Soil Structures	(3)
Seismic Performance and Design of Reinforced Soil Structures with Reference to Lessons Learned from the 1999 Earthquakes of Taiwan and Turkey	(3)
Analysis of Improved Ground and Reinforced Soil Systems Performance during the 1999 Turkey and 2001 Nisqually Earthquakes	(4)
Dynamic Shear Properties of Geosynthetics Interfaces Relevant to Earthquake Hazard Mitigation	(5)
Performance of Existing Geosynthetic Reinforced Slopes during the Northridge-LA Earthquake of January 17, 1994	(5)
Seismic Analysis of Soil Nailed Retaining Structures	(6)
Waveform-Based Earthquake Location	(6)
Pilot Study to Estimate Lateral Earth Pressures on Retaining Walls due to Highway Live Loads	(7)
CANLEX Blasting Experiment Summer 1997	(7)
Advanced Geotechnical Earthquake Engineering Reconnaissance	(8)
Modeling the Seismic Stability of Coal-Waste Tailings Dams	(8)
Shear Wave Velocity Measurements during Ground Improvement at a Municipal Solid Waste Landfill Site in South Carolina	(9)
Reconnaissance of the Geotechnical Aspects of the February 28, 2001 Nisqually Earthquake	(10)
Performance of Improved Ground under Strong Seismic Loading	(10)
Preliminary Investigation and Implications of Improved Ground Performance during the 1999 Turkey Earthquakes	(11)
Geosynthetics for Foundation and Soil Isolation in Earthquake Hazard Mitigation	(12)
Earthquake-Resistant Design and Remediation of Lifelines and Deep Foundations Subjected to Liquefaction	(13)
Seismic Response and Cyclic Behavior of Sands	(14)
Ground Failure of Adapazarı's Fine Grain Soils and Its Interaction with Building Response	(15)
Ground Motion and Source Kinematics Studies of the September 21, 1999 Taiwan Earthquake	(16)
Vibration Testing of Full-Scale Pile Group	(16)

Mechanics of Earthquake Fault Zones: Particle Dynamics Simulations and Laboratory Experiments	(17)
Smart Damping Strategies for Seismic Protection of Urban Structures	(18)
Dynamic Analysis Procedures for Performance-Based Seismic Engineering of Unsymmetric-Plan Buildings	(18)
Dynamic Analysis of Soil-Structure Response under Large Amplitude Shaking with or without Pore Fluid	(20)
Transient Ground Movements Caused by High Speed Trains Crossing Soft Soils	(20)
Dynamic-Stochastic Modeling of Earthquake Rupture and Strong Ground Motion	(21)
2. Theory and Techniques for Soil Reinforcement	(22)
Strain Distribution within Geosynthetic Reinforced Soil Slopes	(22)
Analysis and Synthesis of Reinforced Soil Structures, and Collapse Patterns of Reinforced Soil Type	(23)
Fiber Reinforcement for Soils and Stability of Fiber-Reinforced Soil Structures	(23)
Use of Reinforcement-Drainage Geosynthetics in Embankment/Wall Construction with Marginal Backfill	(24)
Long-Term Performance of Geosynthetically Reinforced Walls: Implications of Creep and Stress Relaxation on Design	(24)
Stabilization of Earth Slopes Using Reticulated In-Situ Reinforcement	(25)
Hybrid Fiber Reinforced Commingled Recycled Plastic Lumber Utilizing Efficient Geometries for Civil Structural Applications	(26)
Geotextile Reinforced Lime-Clay Retaining Walls	(27)
New and Novel Vegetable Fibre Geotextiles to Reinforce and Reinstale Contaminated Soils	(27)
The Design of Retaining Walls in Weak Rock	(27)
A Fundamental Geotechnical Study of How Plant Roots Increase Slope Stability	(28)
Cyclic Behavior of Cemented Sands: Testing, Field Verification, and Modeling	(28)
Accelerating the Thauasite Form of Sulfate Attack and an Investigation of Its Effects on Skin Friction	(29)
Seismic Design of Gravity Retaining Walls: Tilting Type	(30)
Subgrade Repair and Stabilization	(30)
Soil Nailing and Geosynthetic Reinforcement for Seismic Loads	(31)
Seismic Design of Geosynthetic-Reinforced Soil Slopes	(31)
Dynamic Behavior of Tieback Retaining Walls Using Data from the 1989 Loma Prieta Earthquake	(32)
Seismic Behavior of Tied-Back Walls for Earthquake Hazard Mitigation	(32)
Reconnaissance Trip after the Northridge, California Earthquake of January 17, 1994 to Inspect Retaining Walls and Slopes	(33)

Nonlinear Earthquake Response of Tiedback Retaining Walls	(33)
3. Theory and Techniques for Numerical Modeling	(34)
Adaptive Multiple-Scale Meshfree Method for Geo-Mechanics and Earth-Moving Simulation	(34)
Finite Element Analysis of Strain Localizaion in Excavations Research into Network Algorithms and Related Problems	(35)
High Performance Computing Applied to the Modeling of Concrete Dams	(35)
A Framework-Based Finite Element Approach to Solving Current and Future Multi-Physics Problems in Geomaterials	(36)
Microstructural Behavior and Modeling of Particulate Media Structures Interface	(37)
Engineering Application Software for Geotechnical Structures	(37)
BEM Modeling of Stress and Fracture Problems in Anisotropic Media with Gravity	(38)
Structural Integrity of Steep Side Slope Landfill Lining Systems; The Role of Waste/Barrier Interaction	(39)
Numerical Modeling and Analysis of Fractured Rock Mass Strength and Deformability	(39)
Mathematical Modeling of Hydraulic Permeability Evolution in the Damage Zone Surrounding Faults	(40)
Development of Meshless Methods for the Numerical Simulation of Landslides and Debris Flows	(40)
Modeling the Whole Structure Behaviour of the Cardington In-Situ Concrete Building	(41)
Numerical Modeling of Crushable Aggregates	(41)
Preconditioners for Finite Element Modelling of Soil-Structure Interaction Problems	(42)
Composite Foundation Systems Subject to Horizontal Loads	(42)
Improving the Impact Resistance of Masonry Walls	(42)
Extending the Scaled Boundary Finite Element Method To Model Dynamic Two-Phase Soil Structure Interaction	(43)
Parametric Studies of Multiple Tunnels Using the National HPC Resources	(43)
Large-Scale Inversion-Based Modeling of Complex Earthquake Ground Motion in Sedimentary Basins	(44)
4. Risk Assessment and Reliability Analysis	(46)
Risk Assessment of Foundations in Karst Terrain	(46)
Probabilistic Analysis of Geomaterials with Randomly Distributed Shear Strength	(46)
Probabilistic Analysis of Random Geometric Structures	(47)
Micro-Scale Based Reliability Analysis of Mechanical and Flow-Related Behavior of Heterogeneous Materials for Macro-Scale Infrastructure and Geotechnical Applications	(47)
Reliability and Safety of Structures Using Stability-Based Hybrid Controls	(48)

A Systematic Approach to Geomechanical Risk Assessment in Engineered	
Underground Excavations	(48)
Risk Perception and Assessment in Design	(49)
A Time-Dependent Model for Structural Resistance in Risk Assessment for	
Infrastructure	(49)
Project Risk Identification	(50)
Stochastic Modelling of Fractures in Rock Masses	(50)
Collapse Analysis and Displacement Estimates of Degrading MDOF Structures for	
Performance-Based Seismic Design	(51)
Calibrating Engineering Judgment in Geotechnical Risk Analysis	(52)
Risk Management Through Geotechnical Design	(53)
Statistical Analysis of Landfill Monitoring Data	(53)
Performance Based Seismic Evaluation of Underground Structures	(53)
Experimental Evaluation of Robust Controllers in Buildings with Added	
Hysteretic Passive Damping	(54)
Reliability-Based Simulation for Performance-Based Design	(55)
Deterministic Seismic Design Procedures for Building Structures Based	
on Probabilistic Performance Criteria	(55)
An Alternative Approach to Earthquake-Hazard Evaluation for Concrete Building	
Structures	(56)
Performance Evaluation of Steel Structures in Mexico City	(57)
Seismic Hazard Assessment and Seismological Study in the Korean Peninsula Using	
Modern and Historical Earthquake Catalog Data	(57)
The Assessment of the Importance of Vertical Strong Ground-Motions for the Design	
of Structures	(58)
Feasibility of Developing a Time-Based Landslide Hazard Assessment	(58)
Performance of El Nogal Building during the Bomb Attack of February 7, 2003	(59)
Implications of Recorded Data from the 1992 Southern California Earthquakes	
for Earthquake-Resistant Design	(59)
Tools and Techniques for the Technological Integration of Multi-Hazard	
Post-Incident Assessment	(60)
5. Theory for Soil Deformation	(62)
Investigation of Strain Localization in Geomaterials	(62)
Computational Modeling of Strain Localization in Frictional Granular Materials	(62)
Strain Localization in Solid Materials; Microstructural Effects and Computational	
Aspects	(63)
Non-Coaxial Plasticity Models for Soil-Structure Interaction	(63)
Role of Strain Localization and Dilatancy on Deformation and Stability of Soil Slopes ...	(64)

Experimental and Theoretical Investigation of Deformation in Granular Materials; A Micromechanics Approach	(64)
Experimental and Theoretical Investigation of Compaction and Dilation Bands	(65)
Mathematical Models for the Deformation and Flow of Soils and Their Application to Soil Penetration Problems	(66)
Efficient Analysis of Earth Retaining Structures under Different Types of Loading	(66)
Development of an Integrated Tool for Modeling Quasi-Static Deformation in the Solid Earth	(67)
Deformation of Double-Shearing Granular Materials	(67)
Rheology of Damaged Materials with Applications to Deformation in the Earth's Crust	(68)
Response of Saturated Soil to the Intense Heat of Tunnel Fires	(68)
Rapid Load Testing of Piles in Clays	(69)

6. Measurement Systems and Techniques	(70)
Development of an Integrated Materials Testing and High-Resolution Tomography System for Measurement of Three-Dimensional Strain Fields	(70)
Determination of Soil Properties for In-Flight Models Using Bender Elements	(70)
International Development of Non-Destructive Tools to Quantify Sample Disturbance and Its Correlation to Measured Behavior	(71)
Three-dimensional Study of Gravels	(72)
Remote Sensing of Damage in Large Civil Structures Using Embedded Sensors for Hazard Mitigation	(73)
Development of a Multi-Function Geosynthetic Testing Apparatus	(73)
Robotic Systems for Network Interrogation of Smart Civil Structures	(74)
Evaluation of Potential of Earth Resistivity in Norway	(74)
Evaluation of Reliability of Earth Resistivity Method in Thinly Mantled Karst	(75)
Theory and Testing of Electromagnetic Wave Polarization Phenomena for Improving Ground Penetrating Radar Subsurfacing Imaging	(75)
Evaluation of 2D vs 3D Multielectrode Resistivity for the Characterization of Shallow Karst	(76)
Electronic Beam Steering for Ground Probing Radar	(76)
Development of a Multiaxial Geosynthetics and Fibrous Material Test Device	(77)
Acquisition of an Axial-Torsional Loading System for Civil, Mechanical, and Materials Testing	(78)
Nondestructive Evaluation of Geomembranes	(78)
Acquisition of Instrumentation for Non-Contact Multi-Scale Material Response Measurement	(79)
Acquisition of ESEM for Soil Liquefaction Research	(79)

Acquisition and Development of Materials Testing Equipment and Computational Facilities for Granular Media	(80)
Distributed Measurements of Temperature, Moisture and Strain for Civil Engineering Applications in Subsurface Using a Fiber Optic Sensor	(81)
A Wireless Polyvinylidene Fluoride (PVDF) Strain Sensor for Infrastructure Monitoring	(82)
Full Scale Component Testing and Digital Control System Upgrade	(82)
Integrated Fiber Optic Sensor for Condition Monitoring of Concrete and FRP Tendons ...	(83)
Fiber Optic Sensing of Contaminant Materials	(84)
Photonic Test Equipment for Laboratory and Field Use in Fiber Optic Sensing and Smart Structures Research	(84)
Strain Measurements in Bridges By Use of Fiber Optic Sensors	(84)
Low Cost, High Precision Fiber-Optic Sensor System for Infrastructure Monitoring	(85)
Distributed Sensors for Damage Detection and Health Monitoring of Civil Infrastructure	(86)
Optical Fiber Chloride Sensor for Concrete Structures	(86)
Fiber Optic Sensors for Strength Evaluation and Early Warning of Impending Failure in Structural Components	(87)
Novel Fiber Optic Acoustic Sensor System	(87)
In-Situ Strain Measurements in Concrete by Use of Fiber-Optics	(87)
Dual Purpose Etched Polarimetric Optical Fiber Sensor for Concrete	(88)
Structurally Embedded Fiber Optic Thermomechanical Strain State Sensor	(88)
Fatigue Damage Detection of Composite Materials Based on Fiber Optic Vibration Sensing and Neural Network Prediction Techniques	(89)
Long Gage Grating Sensors for Seismic Damage Identification	(90)
Framework for Integrating Embedded Sensors in Durability Analysis of FRP Composites in Civil Infrastructure	(90)
Acquisition and Development of Equipment for Unsaturated Soil Research	(91)
Field Instrumentation and Infra Structure Laboratory	(92)
Stress Redistribution Imaging for Rock Failure Prediction	(92)
Time Domain Reflectometry (TDR) Cable and Grout System to Telemetrically Monitor Soil Slope Stability	(93)
An Investigation of Landslide Assessment and Delineation Using Airborne Laser Swath Mapping	(93)
A Unified Approach to Predicting Long Term Performance of Asphalt-Aggregate Mixtures	(94)
Modelling the Effects of Vegetation on Pore Pressures in Soils	(95)
An Investigation of Hydrologic Scale: Natural Variability Modeling, and Data Collection	(95)

The Study of Interaction between Piled Foundations and Tunnels	(95)
The Mechanisms of Tunnelling-Induced Ground Movements: Their Progressive Effects on Buildings and Their Mitigation	(96)
Acquisition of Geophysical Survey Instruments for Archaeological Research and Training	(96)
The Effects of Tunnelling on Piled Foundations	(97)
Piezoecone Performance in Layered Soils	(98)
Health Monitoring Systems for Large Scale Civil Structures	(98)
Pneumatic Scour Measurement System	(98)
Japan Earthquake Reconnaissance in Structural Engineering	(99)
A System for Long-Term Monitoring of an Advanced Polymer Composite Bridge	(100)
Agent-Based Approach to Smart Sensing for Health Monitoring of Civil Infrastructure	(100)
Built-In Diagnostics for Structural Health Monitoring: An Active Sensing Technique for Civil Infrastructures Applications	(101)
Development and Implementation of Monitoring and Damage Detection Methods for Large Civil Structures	(101)
A Wireless Embedded Sensor System to Monitor and Assess Corrosion in the Tendons of Prestressed Concrete Girders	(103)
Hierarchical Redundancy-Based Monitoring and Robust Seismic Control Systems Type	(103)
Real-Time Intelligent Monitoring of Reinforced Concrete Structures	(104)
Early Detection of Corrosion in Steel Cables by Magnetoelastic Techniques	(105)
An Interdigitated PVDF Guided Wave Transducer for Large Array Condition Monitoring of Steel Structures	(106)
Wireless Sensor Networks for Structural Health Monitoring of Bridges	(107)
Intelligent Health Monitoring of Aerospace Structures Using Wireless Sensor Networks	(107)
Self-Monitoring and Self-Repairing Structural Systems	(108)
Health Monitoring of FRP Composite Bridge Decks	(108)
Feasibility Study of Polymer-Based MEMS Low-Frequency Sensing Technology for Health Monitoring of Civil Structures	(108)
Generic Sensing Modules Development and Hierarchical Technology for Civil and Mechanical Systems	(109)
Health Monitoring and Retrofitting of Infrastructure	(110)
An Integrated Framework for Health Monitoring of Highway Bridges and Civil Infrastructure	(110)
A MEMS Fiber Optic Sensor with High Sensitivity	(112)

Multidisciplinary Research and Modular Courseware Development in Infrastructural Health Monitoring Systems	(112)
Long-Gage Fiber Bragg Sensors for Structural Health Monitoring and Damage Identification	(112)
Development of Nonlinear Modeling Tools for Analysis, Simulation and Structural Health Monitoring	(113)
New Concepts in Long Term Structural Health Monitoring	(114)
Predictive Methodologies for the Design of Lamb-Wave Piezoelectric Wafer Active Sensors for Structural Health Monitoring, Damage Detection and Failure	(115)
Packaging of Structural Health Monitoring Micro-Components	(115)
Analysis and Modeling of Diffuse Ultrasonic Signals for Structural Health Modeling ...	(115)
Structural Health Monitoring Using Local Excitation and Large-Scale Networked Sensing	(117)
Composite Structural Damage Self-Sensing via Electrical Resistance Measurement	(117)
Handling Noise-Contaminated Data and Nonunique Identification Results in Wireless Sensor Networks for Structural Health Monitoring	(118)
Health Monitoring of Multi-Strand Steel Tendons and Cable Stays for Civil Structures	(119)
Geotechnical Earthquake Engineering Reconnaissance of the September 21, 1999 Taiwan Earthquake	(120)
Investigation of Embedded Sensing Architecture for Damage Detection	(120)
U. S. -Polish Research on Structural Health Monitoring Using Piezo-Generated Elastic Waves: Feasibility Study	(121)
Robust Event Services for Emergency Response in Sensor Networks	(122)
RESCUENET—Embedded In-Building Sensor Network to Assist Disaster Rescue	(123)
Integrated Monitoring and Smart Damping for Dynamic Hazard Mitigation	(124)
Attenuation Mechanisms and Measurements	(124)
Surveying and In-Situ Measurement of the Ground Displacement and Failure in the Van Norman Facilities of the Los Angeles Department of Water and Power after the 1994 Earthquake	(125)
Composition and Structure of Gouge from the Focal Depths of Recent Earthquakes: Rupture Zones in South African Gold Mines	(125)
Insitu Assessment of Contaminant Containment Systems	(126)
Underground Pipe Locator	(127)
Use of Immersive Virtual Environments as a Collaborative Tool for the Study of Architectural Building Components Subjected to Earthquake Excitations	(127)
Structural Integrity Monitoring of Civil Structures Using Optical Fibre Sensor Technology	(128)

7. Fundamental Theory for Soils	(129)
Mechanical Interference in Particulate Media	(129)
Mechanics of Granular Material	(129)
Strength of Clay Shale in Relation to Mineralogy, Micromorphology, and Pore Water Chemistry	(130)
Membrane Behavior of Clay Soil Barrier Materials	(130)
The Mechanics of Flow of Particulate Media	(131)
The Effects of Temperature Distributions on the Flexural Behavior of Frozen Soil	(131)
Rainfall Characteristics and the Influence of Urban Land Use on Shallow Landslide Initiation in Seattle, Washington	(131)
Cohesionless Soil and Small Discontinuous Reinforcing Elements in Composite Engineering Material	(132)
A Lattice Type Approach for the Micro-mechanical Response of Granular Assemblies	(132)
Case Studies and Tsunami Community Model for Underwater Landslide Tsunamis	(133)
An Analysis of Biotic and Physical Factors in El Nino-Induced Landslides	(133)
Investigation of Causes and Mechanisms of Landslides and Mudboils in the Tully Valley, NY	(134)
Geology Labs On-Line	(134)
Test of a Rheological Slope Stability Model	(134)
Stability and Shakedown Analysis of Soil and Pavement Structures	(135)
Long Term Behaviour of Cement-Treated Soils	(135)
Influence of Seasonal Cycles on the Stability of Slopes and Embankments	(136)
Soil Mechanics at the Grain Scale	(136)
A Study of the Mechanical Characteristics of Residual Soils	(137)
Micro Mechanics of Railway Ballast Degradation	(137)
The Design of Flexible Linings for the Rehabilitation of Sewer Pipes	(138)
Just-In-Time Pile Design	(138)
The Influence of State on the Capacity of Driven Piles in Sand	(138)
Dynamic Properties of Terrestrial Soils and Marine Sediments	(139)
The Evolution of Crushing in Granular Materials and Its Influence on Their Mechanical Properties	(139)
Residual Strength after Liquefaction: A Rheological Approach	(140)
Large Scale Siesmic Performance of Urban Regions	(141)
The Coupled Sliding and Tilting, Obstructed Motion and Repeated Loading Behavior of Gravity Retaining Walls under Seismic Excitation	(142)
Experimental Investigations on Chemically Treated Sulfate Soils For Fundamental Understanding of Heaving Mechanisms	(142)

8. Seepage Problems	(144)
Hydromechanical Evaluation of Flow Behavior in Rock Foundations of Concrete	
Gravity Dams	(144)
Developing a Paste Formulation Criterion	(144)
Thermally Driven Texture Development of Setting Bubbly Liquids	(145)
Experimental Study of Earthquake-Induced Soil Liquefaction and Lateral	
Spreading and Its Effects on Pile-Supported Port Facilities	(145)
Fundamental and Applied Problems in Granular Flow	(146)
Overpressure and Fluid Flow in New Jersey Continental Slope: Implications	
for Slope Stability and Cold Seeps	(147)
Experimental Test of Debris Flow Initiation Model	(147)
Subsurface Flow in Relation to Landslide Initiation	(148)
The Importance of Osmosis in the Volumetric Behavior of Undisturbed	
and Expansive Earth Materials	(148)
9. Environmental Problems	(150)
US-Czech Research on Environmental Policy Learning and Capacity Development	(150)
An Integrated Study of Post-Flood Hydrology, Ecology, Politics and Policy Change:	
A Cross-National, Urban Perspective	(151)
An Interdisciplinary Approach to Coastal Vulnerability and Community	
Sustainability	(151)
The Effect of Dams on Riparian Vegetation Dispersal	(152)
Subsurface Construction, Resulting Ground Movements, and Protection	
of the Built Environment	(153)
Surface Blast Effects on Embankments and Dikes	(153)
10. Unsaturated Soil Mechanics	(155)
Unsaturated Soil Mechanics in Engineering Practice	(155)
Interpretation of In-Situ Tests in Unsaturated Soils	(155)
Microfracture and Repeated Plastic Deformation in Unsaturated Soils as Influenced	
by Surficial Properties	(156)
Development of the Constant-Flow Method for Concurrent Measurement of the	
Soil-Water Characteristic Curve and Hydraulic Conductivity Function of	
Unsaturated Soils	(157)
Development of a Strain/Temperature/Suction-Controlled True Triaxial Testing	
Device for Modeling Unsaturated Soil Behavior under Multi-Axial Stress States	(159)
Impact of Extent of Wetting in Arid Region Geotechnical Practice	(159)
Fast, High Order Vortex Methods Based on Deforming Basis Functions	(160)

Equilibria and Mass Transfer Characteristics of Nonvolatile Organic Chemicals in Unsaturated Soils	(161)
Prediction of Unsaturated Hydraulic Properties with Neural Network Models	(161)
A Comprehensive Approach to Modeling Stress-Strain Behavior of Unsaturated Soils for Geohazard Mitigation	(162)
An Investigation of the Stress-Strain and Strength Behaviour of Unsaturated Reconstituted Soils	(163)
Numerical Modelling of a NAPL Plume and Organic Vapour Transport in Unsaturated Soil	(163)
Colloid Mobilization and Transport in the Vadose Zone	(164)
Static and Dynamic Behavior of Unsaturated Soils: Theory and Validation	(164)
11. Optimization of Structures	(166)
Optimal Structural System Design for Catastrophic Unforeseen Events	(166)
Seismic Design of Energy Dissipation Systems for Optimal Structural Performance	(166)
A Novel Building Material for Panelized Construction	(167)
Genetic Algorithm Development for Multi-Objective Optimization of Seismic Mixed-Constructed Structures with/without Control of Systems	(168)
Testing a Retrofit Concept to Prevent Progressive Collapse	(169)
Multi-Objective Reliability-Based Optimum Design and Upgrading of Seismic-Resistant RC Structures for Cost-Effectiveness	(169)
Multiobjective Genetic Algorithms	(170)
Seismic Response of Semi-Rigid Steel Building Structures	(171)
Materials for Structural Vibration Avoidance	(171)
Inelastic Response and Collapse of Steel Building Structures Subjected to Multicomponent Seismic Excitations	(171)
Semi-Active Control of Variable Stiffness for Building Structures	(172)
Reliability-Based Seismic Design Criteria for Reinforced Concrete Buildings	(172)
Hybrid Control of Building Seismic Response Using Architectural Cladding	(173)
Active Control of Floor Vibration	(173)
Safety and Performance Enhancement of Structures through Structural Control	(174)
Seismic Response and Retrofit Studies of Selected Steel and Composite Buildings	(174)
Composite Interaction of Steel Frame Members and Reinforced Concrete Walls under Seismic Loading	(174)
Development of Bolted End Plate Connections for Steel Reinforced Concrete Composite Structures	(175)
Design and Integration of Piezoelectric Actuators in Civil Engineering Structures	(176)
Seismic Behavior and Design of Non-Emulative Precast Concrete Buildings with Supplemental Passive Energy Dissipation	(176)

Performance of Microbiologically Enhanced Concrete Structural Elements	(177)
Seismic Rehabilitation of Unreinforced Building Structures Using Post-Tensioned Steel Braces	(178)
Development of Composite Yielding Dampers	(179)
Experimental and Analytical Investigations of the Fire Behavior of CFT Beam-Columns	(180)
Shear Capacity of High-Strength Concrete Beam-Column Connections	(180)
Advanced Seismic Design Methods for Precast Cladding	(181)
12. Nonlinear Mechanics	(182)
Chaos Dynamics of Elasto-Plastic Structures: Experiments and Novel Computational Methods	(182)
Nonlinear Problems of Solid Mechanics	(182)
Symmetry Methods and Nonlinear Analysis in Elastomechanics	(183)
Nonlinear System Identification for Real-Time Structural Health Monitoring in Composite Materials	(183)
NEES Experimental Project for Verifying Full-Scale Semiactive Control of Nonlinear Structures	(184)
Optimal Hybrid Control of Buildings with Nonlinear Hysteretic Cladding Connection Elements	(185)
Experimental and Analytical Studies of Nonlinear Structural Systems under Earthquake Loads	(185)
Fracture of High-Performance Quasibrittle Materials: Effects of Loading Rate and Fatigue	(186)
13. New Materials and Theories	(188)
Knowledge Based Expert Systems for Retaining Wall Rehabilitation Design and Cost Estimation	(188)
Environmentally Benign Reuse of Waste Tires	(188)
New Design Criteria for Soil-Construction Material Interface Systems	(189)
Expert System for Retaining Wall Selection	(190)
Application of Neural Networks for the Safety and Performance Evaluations of Infrastructure Systems	(190)
A New Approach for Determining Design Soil Parameters from In-Situ Tests	(190)
Unstable Regions around Underground Openings: A Model Based on Block Theory, Reliability, Stress Analysis and Linear Programming	(190)
Validation of Block Theory and Discontinuous Deformation Analysis with Data from Field Case Histories and Model Experiments	(191)
Developing a Landfill Siting Approach Using Fuzzy Sets	(191)

Reliability of Existing Framed Structures Using Approximate Reasoning	(192)
Harnessing the Power of Computational Intelligence for Infrastructure Systems	
Management and Control	(192)
Fuzzy Regression and Interpolation with Application to Fuzzy Reliability	(193)
Effects of Errors on Seismic Safety	(193)
Stochastic Methods for Seismic Engineering Applications	(193)
Stochastic Flow and Transport in Heterogeneous Soils: Nonstationarity, Scale	
Interaction and an Efficient Modeling Framework	(194)
Stochastic Analysis of Soil-Structure Interaction	(194)
Random Fields of Micromechanics: Constitutive Laws and Plastic Flow	(195)
Time-Dependent Damage Accumulation and Failure in Materials	(195)
Stochastic Flow and Transport in Heterogeneous Soils: A New Approach	
for Measurement Conditioning	(195)
Integrated, Scalable MBS for Flow Through Porous Media	(196)
Stochastic and Multiscale Structure Associated with the Navier Stokes Equations	(197)
Manifold Method for Modelling Fracturing in Quasi-Brittle Materials	(198)
Computational Strategies for Large Scale Discrete Systems and Multi-Facturing	
Solids	(198)
The Failure Mechanisms of Asphalt Pavements	(199)
Assessment of the Pullout Resistance of Soil Nails	(199)
Condition Monitoring and Asset Management for Complex Infrastructure Systems	(200)
Particle-Driven Flows down Steep Slopes	(200)
Assessing the Environmental Impact of Treated Wastes and By-Products	
in Pavement Foundations	(201)
Analysing the Behaviour of Footings on Sand Using an Advanced Constitutive	
Soil Model	(201)
The Application of Genetic Algorithms to Open Pit Design and Scheduling	(201)
The Fractal Finite Element Method in Solid Mechanics	(202)
Characterisation of Comminuted Fragments by Applied Fractal Geometry	(202)
Mechanisms of Agglomerate Formations	(203)
The Geostatistical Calibration and Integration of Seismic Geophysical and	
Core Data	(203)
Spatial-Temporal Analysis of Earthquake Catalogs Using Point Processes	(203)
Towards Near-Real-Time Site Characterization: Advanced Computational Methods	
and NEES-Based Validation Experiments	(204)
Strengthening of Bridges Using Polymeric Composite Materials	(205)
New Techniques for the Evaluation and Interpretation of Results of the Analysis	
of Building Structures Subjected to Earthquakes	(205)
Development of Adaptive Hybrid Control Techniques for Building Structures	(206)

Performance and Tracking of Nonstructural Systems in a Full-Scale Building	(206)
Application of High-Precision Earthquake Location to Subduction Zones:	
Japan and New Zealand	(207)
Spectral-Element Simulations of Seismic Wave Propagation	(208)
Theory and Applications of Multigrid	(209)
Expert Systems for Earthquake-Resistant Design of Buildings	(209)
Temporal Characteristics of Velocity/Acceleration Pulses and Seismic Damage	
of Structures	(210)
New Methods and Tools for Nanotechnololgy	(210)
A Hybrid Sliding Isolation System with Controllable Friction Bearings	(211)
Acquisition of Physical and Numerical Geomechanics Laboratory Equipment	(212)
Role of Building Overstrength in Developing Seismic Response Spectra	(213)
Repair and Retrofit Systems for Civil Infrastructure	(213)
Prevalence and Preparedness for Conjoint Natural and Technological Disasters	(214)
Theoretical Prediction of Coarse Particle Shape Evolution during Attrition	
in a Stirred Vessel	(215)
An Integrated Lithic and Pumice Compositional Study of the Bandelier Tuff	(216)
Earthquake Spectra and Real-Time Ground Motions for Design Purposes	(216)
Documentation and Evaluation of Factors Controlling Seismic Slope Stability	
Using GIS	(217)
Seismic Hazard Prediction Using Fuzzy Sets	(218)
Seismic Design of Earth and Rockfill Dams	(218)
Developing a New Model for Assessing Earthquake-Induced Liquefaction Hazards	(218)
A New Temporal-Spatial Dislocation Source Model	(219)
Controlled Foam Injection for the Fracturing of Rock and Concrete	(219)
Automated Synthesis of Quantum Circuits	(220)
Land Use and Land Tenure in Prehispanic Tlaxcala	(221)
References	(223)