

STP 1350

***Nondestructive and Automated
Testing for Soil and
Rock Properties***

W. A. Marr and C. E. Fairhurst, Editors

ASTM Stock #: STP1350

ASTM
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

Printed in the U.S.A.

Contents

Overview

vii

NONDESTRUCTIVE TESTING IN THE LABORATORY

- Automated Soil Particle Specific Gravity Analysis Using Bulk Flow and Helium Pycnometry**—STANLEY J. VITTON, MICHAEL A. LEHMAN, AND THOMAS J. VAN DAM 3
- Active and Passive Acoustic Imaging Inside a Large-Scale Polyaxial Hydraulic Fracture Test**—STEVEN D. GLÄSER, JOHN W. DUDLEY II, AND JACOB SHYLAPOBERSKY 14
- Qualitative Assessment of Soil Behavior Utilizing the Environmental Scanning Electron Microscope**—HORACE K. MOO-YOUNG AND CHARLES E. OCHOLA 29
- Experimental Study of the Relationship Between Formation Factor, Porosity, and Cementation**—MICHAEL D. HARIG AND RONALD C. CHANEY 43
- Portable Measurement System for Soil Resistivity and Application to Quarternary Clayey Sediment**—KOICHI NAKAGAWA AND TAKEO MORII 57
- Automated Soil Particle-Size Analysis Using X-Ray Absorption**—STANLEY J. VITTON, NICOLE L. OTT, AND MICHAEL A. LEHMAN 69
- Nondestructive Laboratory Measurement of Geotechnical and Geoacoustic Properties Through Intact Core-Liner**—ROBERT E. KAYEN, BRIAN D. EDWARDS, AND HOMA J. LEE 83
- Nondestructive Analysis of Fine-Grained Soils Utilizing Medical Imaging**—HORACE K. MOO-YOUNG, JR. AND CHRIS LAPLANTE 95

NONDESTRUCTIVE TESTING IN THE FIELD

- Time-Domain Reflectometry (TDR) in Geotechnics: A Review**—CRAIG H. BENSON AND PETER J. BOSSCHER 113

Borehole SASW Testing to Evaluate LOG (G_{max})-LOG (σ') Relationships in Situ—M. E. KALINSKI, K. H. STOKOE II, Y. L. YOUNG, AND J. M. ROESSET	137
Measurements and Modeling of Surface Waves in Drilled Shafts in Rock—M. E. KALINSKI, K. H. STOKOE II, J. M. ROESSET, AND D.-S. CHENG	156
Measurement of Construction Induced Vibrations—LISHENG SHAO AND ROY H. BORDEN	170
AUTOMATED TESTING	
Survey of Automation Practices in Geotechnical Laboratories—W. ALLEN MARR	193
State of the Art: Automated Laboratory Stress-Strain-Strength Testing of Soils—THOMAS C. SHEAHAN, DON J. DEGROOT, AND TRAVIS J. MITCHELL	203
Automated Triaxial Apparatus for Elevated Pressures—TERESA CUCCOVILLO AND MATTHEW R. COOP	231
Laboratory Evaluation of Mechanical Properties of Rock Using an Automated Triaxial Compression Test with a Constant Mean Stress Criterion—KIRBY D. MELLEGARD AND TOM W. PFEIFLE	247
Modeling Pre-Failure Stress-Strain Properties of Sedimentary Softrock Based on Very Small Strain Stiffness—K. HAYANO, F. TATSUOKA, AND N. YOSHIZUMI	259
Advanced Control Techniques for Direct Shear Testing of Jointed Rock Specimens—MANFRED BLÜMEL AND FREDERICK A. BEZAT	276
The Value of Numerical Modeling in Understanding the Complete Load/Deformation Behavior of Cohesive-Frictional Materials—DAVID O. POTYONDY AND CHARLES E. FAIRHURST	290
Experiences with Automated Geotechnical Testing—W. ALLEN MARR, GARY T. TOROSIAN, AND RACHID HANKOUR	300
Index	319