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FIELD MEASUREMENTS IN GEOMECHANICS

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Swiss Federal Institute of Technology, Zurich

VOLUME 2



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Preface

Field measurements are an indispensable means of safety control of structures in their different stages of construction and during their service life. They also provide a tool for economic design by revealing the actual behaviour of the structure thus permitting the calibration of theoretical models or initial assumptions. In fact, several recent developments in geotechnical practice would be unthinkable without advanced monitoring techniques.

The main objective of this Symposium was to review current techniques of field measurement in geomechanics and to provide a forum for presentation of new developments. Special emphasis was given to the identification of fundamental aspects of instrumentation valid for a number of areas such as soil and rock mechanics and the foundations of large dams. It is probably the first time that field measurement problems associated with radioactive waste disposal were dealt with separately in an international symposium, showing its increasing importance. What are the factors favouring the present-day developments in instrumentation? Undoubtedly the increasing public sensitivity to the safety of important structures and to accident prevention is most important. Such requirements are specially pronounced in the case of large excavations, large dams, off-shore engineering and radioactive waste disposal. Another factor is given by the recognition that even highly sophisticated numerical calculations have their limitations if the underlying models are not calibrated by observations in a quantitative manner. Here we are not thinking only of the accuracy of the input material parameters but rather of the correctness of concepts upon which the simplifications of reality are based. So more and more large scale field monitoring is being carried out aimed at obtaining firm ground for theoretical considerations. A further factor calling for instrumentation comes from the so-called «design as you go» procedure frequently applied in deep tunnels, in mining and even in slope engineering. When the soil or rock conditions cannot be assessed in advance many decisions concerning design and construction must be made as the work proceeds. This does not imply doing things simply by a «trial and error» method because of the clear objectives in monitoring and its continuous evaluation. The last main factor promoting present activities in instrumentation stems from the rapid advances of electronics. In the near future the sensors may become smaller in size, more rugged, probably less sensitive to humidity and to temperature changes and even more precise. We can also anticipate decreasing costs. But also in data processing completely new possibilities are likely to emerge. Readings and data processing will

take place in one operation providing immediate on-site information. This is the case in many instances already today.

An important achievement of the symposium resides in its multidisciplinary character. By the common efforts of the contributors it has been possible to shift from the level of pure measuring technique to an approach with true scientific character. This involves the establishment of a strict methodology and of sound principles of broad validity. Such procedures are well demonstrated by the numerous case histories reported in these proceedings.

The outstanding contribution of Mr. Ch. Amstad and Mr. A. Tisa to the organization of the symposium and to the edition of the proceedings deserves special appreciation and thanks.

January, 1984

K. Kovári

CONTENTS**VOLUME I****FUNDAMENTALS OF FIELD INSTRUMENTATION**

Amberg, R. Hertelendy, A.	New Methods of Measuring Technique in Underground Openings	3
Bock, H. Foruria, V.	A Recoverable Borehole Slotting Instrument for In Situ Stress Measurements in Rocks not Requiring Overcoring	15
Bordes, J. L. Debreuille, P. J.	Bore-Hole Monitoring Instrumentation for Rock Mechanics	31
Capelle, J. F.	A New Instrument for the In Situ Measurement of the Permeability of Clays: The Self Boring Non-Clogging Permeameter	49
Cyru, T.	Notes on Stress Determination in Heterogeneous Rocks	59
Dunbavan, M.	Instrumentation for Research in Australian Surface Coal Mines	71
Dusseault, M. B. Nyland, E.	Passive Seismic Monitoring of In Situ Processes for Energy Recovery	81
Fecker, E. Frick, F. Gloetzel, F. Gloetzel, R. Sauer, G.	Surveying and Monitoring of Historic Monuments	93
Hagan, T. N.	Field Measurements of Rock Properties – an Essential Requirement for Optimising Blast Design	105
Haimson, B. C.	The State of Stress at the Nevada Test Site: A Demonstration of the Reliability of Hydrofracturing and Overcoring Techniques	115

Helal, H. Schwartzmann, R.	In Situ Stress Measurements with the Cerchar Dilatometric Cell	127
Huder, J. Lang, H. J.	The Significance and Purpose of Geotechnical Field Measurements	137
Jakubick, A. T.	Vacuum Logging for Measurement of the Integrity of the Near-Excavation Zone	163
Khan, I. H.	An Electro-Capacitance Gauge for Stress Measurements	177
Kletzel, G. S. Tkatchev, V. A. Lebedev, Y. A.	Practice of Measurements of Stressed State of Rock Mass by Means of a Multicomponent Dilatometer	187
Kohibeck, F. Scheidegger, A.	Application of Strain Gages on Rock and Concrete	197
Köppel, J. Amstad, Ch. Kovári, K.	The Measurement of Displacement Vectors with the "Trivec" Borehole Probe	209
Kovári, K. Amstad, Ch.	Fundamentals of Deformation Measurements in Geomechanics	219
Lo, K. W. Heng, R. B. W.	Detection of Ground Anomalies by Steady-State Excitation	241
Mikkelsen, P. E. Wilson, S. D.	Field Instrumentation: Accuracy, Performance, Automation and Procurement	251
Müller, I.	Anisotropic Properties of Rocks Detected with Electro-Magnetic VLF Measurements	273
Ohya, S.	Current State of Field Measurement in Japan - on the New Developments in Geophysical and Geotechnical Instruments	283
Otta, L.	Contribution to Slope Indicator Measurements	293
Santoyo, E. Holguín, E.	An Inclinomater for Soft Soils	303
Schaap, L. H. J. Hoogendoorn, H. G.	A Versatile Measuring System for Electric Cone Penetration Testing	313

Schaap, L. H. J. Lifting, H.	Geotechnical Applications of Solid State Recorders	325
Schuppener, B.	Inclinometer Measurements in Foundation Engineering	335
Shemyakin, E. I. Kurlenya, M. V. Popov, S. N.	Elaboration of Parallel Boreholes Method for Investigation of Stress State and Deformation Properties in Rock Masses	349

PILES AND DIAPHRAGM WALLS

Carvalho, O. Kovári, K.	Continuous Strain Monitoring of Large Diameter Steel Piles	361
Cooke, R. W.	The Instrumentation of Piled Foundations in Cohesive Soils	373
Costopoulos, S. D.	Cast in Situ Diaphragm for a Tieback in a Clayey Soil. A Case Study	395
DiBiagio, E.	Instruments and Instrumentation Techniques Used to Monitor the Performance of Offshore Structures	405
Dietrich, H.	Instrumentation of Test Piles	435
Durgunoglu, T.	A Case Study for the Use of In Situ Measurements in Foundation Design	441
Dysli, M.	Some Practical Considerations on Piles and Diaphragm Walls Instrumentation	451
Green, G. E. Feldman, A. I. Thordarson, P.	A Pile Tip Load Cell for a Driven Concrete Pile	463
Johnson, P. Ritson, R. John, N.	Development of Instrumentation for Monitoring Reinforced Soil Walls	473

Johnston, I. W.	A Pressure Cell for Shear and Normal Stress Measurement in Piles	483
Middendorp, P. Van Brederode, P. J.	A Field Monitoring Technique for the Integrity Testing of Foundation Piles	493
Moore, B. H. Alizadeh, M. M.	Design and Performance of Cellular Cofferdam Instrumentation	503
Nowack, F. Gartung, E.	Instrumentation of Cast in Place Piles for Vertical and Horizontal Load Testing	513
Poskitt, T. J. Cuthbert, L. G.	Reliable Instrumentation for Field Measurements on Piles	523
Price, G. Wardle, I. F.	Recent Developments in Pile/Soil Instrumentation Systems	533
Prodinger, W.	Measurement of the Redistribution of Stress Around Deep Foundations	543
Soares, M. M.	The Instrumentation of a Diaphragm Wall for the Excavation for the Rio de Janeiro Underground	553
Steenfeld, J. S.	Automated Alarm and Data Acquisition System for Reinforcement Works at Coal Terminal Quay Wall	565
Strobl, T. Katzenbach, R.	In Situ Tests, Measurements and Calculation for a High Loaded Single Foundation Near a Slurry Trench	575
Yong, K. Y. Chin, Y. K.	Practical Aspects of Pile Instrumentation	585

SLOPES IN SOIL AND ROCK

Aigotti, D. Armando, E. Barla, G. Forlati, F.	Geophysical and Geomechanical Measurements Along a Natural Slope	597
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Barton, M. E. Coles, B. J.	Rates of Movement of Soil Slopes in Southern England Using Inclinometers and Surface Peg Surveying	609
Bonnard, Ch.	Determination of Slow Landslide Activity by Multidisciplinary Measurement Techniques	619
Brand, E. W. Borrie, G. W. Shen, J. M.	Field Measurements in Hong Kong Residual Soils	639
Brandt, J. R. Eisenstein, Z.	Instrumentation for Soil Structure Interaction	649
Chedsey, G. L. Dorey, R.	Instrumentation of a Major Tailings Impoundment in Idaho, U.S.A.	661
Green, G. E. Roberts, D. A.	Remote Monitoring of a Coal Waste Embankment	671
Ito, H. Kitahara, Y. Motojima, M. Hibino, S.	Field Measurement and Analysis of the Behaviour of Large Scale Slopes Cutting	683
Ludwig, H. P. Weatherby, D. E. Yong, R. N.	Monitoring and Evaluation of Temporary and Permanent Tiebacks in Cohesive Soils	693
Ortigao, J. A. R. Lacerda, W. A. Werneck, L. G.	The Behaviour of the Instrumentation of an Embankment on Clay	703
Patton, F. D.	The Role of Instrumentation in the Analysis of the Stability of Rock Slopes	719
Penning, A. Van der Kogel, H. Körner, R. M. Schenkeveld, F. M.	Acoustic Emissions During Slope Failure	749
Rozsa, L. Vidacs, L.	New and Easy Method for Measuring Settlement of Embankments	765
Stepanov, V. Y.	Monitoring of Rock Slope Stability with Quartz Extensometers and Hydrostatic Levels	773

VOLUME 2

FOUNDATIONS OF LARGE DAMS

Cardia, R. J. R.	Monitoring of the Foundations for Concrete Structures of Agua Vermelha Hydroelectric Power Plant	783
Deletie, P. Lakshmanan, J. Lemoine, Y. Martinet, A.	Takamaka Dam (Reunion Island): Geotechnical Survey	795
De Mello, V. F. B.	Design Trends on Large Rockfill Dams and Purposeful Monitoring Needs	805
Doležalova, M.	Case History of a Rockfill Dam with Interpretation of the Measurement Results by Computational Model	827
Fanelli, M.	Influence of Rock Behaviour on Foundation of Concrete Dams	839
Fishman, Y. A. Shangin, V. S.	Analysis of Displacements of Concrete Shear Blocks and Concrete Dams on Rock Foundation by the Field Measurements Results	865
Fujii, H. Watanabe, T.	Pore Pressure of Small Fill Dams	875
Gaziev, E. G. Lomov, I. E. Tizdel, P. P. Khakimova, G. H.	Vertical Settlement of Rock Foundation at Ingouri Arch Dam During First Stage Filling of Reservoir	885
Joshi, A. B. Sharma, V. M.	Geotechnical Investigations for the Stability of a Concrete Dam on Weak Rock Pedestal	891
Kaloustian, E. S.	Results of Field Studies of the Inguri Arch Dam Rock Foundation Behaviour with Use of Rock Strain Gauges	901

Kast, K. Blinde, A. Blinde, J.	Rockfill Dam with Asphalt Concrete Core, Instrumentation, Results of Measurements During Construction	907
Lytle, J. D.	Precise Mensuration with Electronic Distance Measurement Equipment to Assure Dam Safety	917
Salembier, M.	Some Applications of Disto for Extensometer to Large Dam Foundations	927
Sokolov, I. B. Aleksandrovskaia, E. K. Urakhchin, V. P.	Field Investigations of Displacements in the High Concrete Dams on Rock Foundations	935
Sousa, L. R. Mascarenhas, A. T.	Analysis and Observation of the Behaviour of Aguieira Dam Foundation	945
Souza Lima, V. Abrahamo, R. A. Silveira, J. F. A.	Some Aspects of Numerical Procedures and Field Measurements in the Design and Moni- toring of Rock Foundations of Concrete Dams	955
Van Heerden, W. L.	Determination of Rock Mass Moduli and In Situ Stresses for a Hydro-Electric Scheme in South Africa	967

UNDERGROUND OPENINGS

Alvarez, A. Herrero, E. Buil, J. M.	Stresses and Strains Associated with Underground Openings in the Moralets Powerhouse	981
Barla, G. Rossi, P. P.	Stress Measurement in Tunnel Lining	987
Celio, T. Matthias, H.	PMS 2 Fast Automatic Profile Recorder for Underground Surveys	999

Del Greco, O.	Application of Stress Measurements for the Solution of Mining Problems in Italy	1007
Gonze, P.	Verification of the Stability of Excavations in Artificially Frozen Ground	1021
Heusermann, St. Pahl, A.	Stress Measurements in Underground Openings by the Overcoring Method and by the Flatjack Method with Compensation	1033
Hisatake, M. Ito, T.	Back Analysis Methods for Tunnel Linings	1047
Ivanov, V. Parashkevov, R. Popov, S. N.	Deformations Measurement with the Method of Partial Stress Relief and Geomechanical Processing of the Results	1057
John, M. Poettler, R.	Application of the Integrated Measuring Technique	1063
Kondoh, T.	Evaluation of Apparent Young's Modulus of Rocks Surrounding Underground Openings	1073
Markov, G. A. Kosyrev Panin, A. A. Ivanov, V. I. Pavlovsky, V. I. Ivanov, G. A.	Field Determination of Tectonic Stresses in Massif to Predict Rock Pressure in Mines	1083
Matthias, H.	A Simple, Fast and Accurate Method for Underground Deformation Measurements with Theodolite Only	1093
Mettier, K.	Measurements and Results of Applying the Ground Freezing Method in Tunnelling	1103
Miyashita, K. Aoki, K. Hanamura, T. Kashiwagi, N.	An Investigation of Geomechanics and Hydraulics Around an Underground Crude Oil Storage Cavern	1117

Niedermeyer, S. Rahn, W. Rothengatter Effenberger, K.	Results of Geotechnical Investigations for Tunnels in the Bunter Sandstone- Formation	1127
O'Connor, K.	Coal Mine Subsidence Monitoring Instrumentation	1137
Poellae, J. Saerckae, P. Kaehoenen, Y. Leinonen, J.	Field Measurements in the Mustikkamaa Oil Storage Facilities	1153
Sakurai, S.	Displacement Measurements Associated with the Design of Underground Openings	1163
Sánchez-Trejo, R. Moreno-Fernandez, A.	Behaviour of a Tunnel Excavated Through Soft Ground by Means of a Shield and Compressed Air Chambers	1179
Singh, R. N. Aziz, N. I.	Instrumentation for Stability Evaluation of Coal Mine Tunnels and Excavations	1191
Spathis, A. T. Blair, D. P. Grant, J. R.	Seismic Pulse Assessment of Tunnel Walls in Rock	1205
Stillborg, B. Pekkari, S. Pekkari R. 1215	An Advanced Rock Mechanics Monitoring System	1215
Szwedzicki, T. Lojas, J.	Penetrometer Measurements of the Effect of Undermining on the Overlying Roadways	1229
Takino, K. Kamemura, K. Kimura, H. Kawamoto, T. Kawamoto, T.	Three-Dimensional Ground Behaviour at Tunnel Intersections	1237
Ueng, Tsou-Shin Kao, Cheng-Yi Chi, B. P. Huang, Tsan-Hwei	Field Instrumentation of Minghu Underground Powerplant Excavation	1247

Whittacker, B. N. Bonsall, C. J. White, M. J. Hassani, F. P.	Investigations Into the Development of Rock Yield Zones Around Mining Tunnels	1257
Yang, Zhifa Liu, Zhuhua Wang, Sijing	A Practical Back Analysis Method from Displace- ments to Estimate Some Parameters of a Rock Mass for Design of an Underground Opening	1267
Yokoyama, A. Fujimori, F. Hirano, I. Kamemura, K.	Ground Behaviour Measurements During Thin Overburden Soil Tunnel Excavation	1277

RADIOACTIVE WASTE DISPOSAL

Ahagen, H.	Instruments for Hydrogeological and Geochemical Measurements in Deep Boreholes	1289
Black, J. H.	Treating Granite as Fissured Porous Media	1299
Eisenburger, D. Kopietz, J. Liedtke, L. Meister, D.	Instrumentation and FE Calculations of In Situ Heating Experiments in a Salt Mine Related to the Permanent Disposal of High Level Wastes	1309
Fischle, W. R. Schauermann, V. Schwieger, K.	Experience Made with the Geotechnical Instru- mentation of Seals in Entrances to Disposal Rooms for Low-Level Radioactive Wastes	1321
Flach, D. Frohn, C. Hente, B. Schmidt, M. W. Taubert, E.	Hydraulic Fracturing Experiments in Rock Salt with Seismic Frac Location	1331

Gale, J. E. Rouleau, A.	Characterizing and Interpreting the Geometry, Permeability and Porosity of Fractures for Repository Evaluation	1343
Hente, B.	Microseismic Monitoring of a Salt Mine	1371
Hustrulid, W.	Design of Geomechanical Experiments for Radioactive Waste Disposal-A Rethink	1381
Lingle, R. Bakhtar, K. Barton, N.	Extraordinary Geomechanical Instrumentation Applications	1409
Neerdael, B. Buyens, M. Lejeune, M. Thimus, J. F. Funcken, R. Dethy, B.	Field Measurements During the Construction of an Underground Laboratory in a Deep Clay Formation	1419
Patrick, W. C. Rector, N. L.	Reliability of Instrumentation in a Simulated Nuclear-Waste Repository Environment	1431
Roberds, W. J.	In Situ Testing Requirements	1441