

The picture on the front cover shows the old Castel dell'Ovo, built by the Normans in the 12th century on a tuffaceous islet present just in front of the hotel where the Symposium will take place. The castel, whose walls are also constituted by tuff stones, is a symbol of the relevance of such material for the town.

This symposium was organised under the auspices of:
International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)
International Society for Rock Mechanics (ISRM)
International Association for Engineering Geology and the Environment (IAEG)
Associazione Geotecnica Italiana (AGI)



The texts of the various papers in this volume were set individually by typists under the supervision of each of the authors concerned.

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by A.A. Balkema, Rotterdam, provided that the base fee of US\$ 1.50 per copy, plus US\$ 0.10 per page is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is: 90 5809 018 3/98 US\$ 1.50 + US\$ 0.10.

Published by
A.A. Balkema, P.O. Box 1675, 3000 BR Rotterdam, Netherlands
Fax: +31.10.413.5947; E-mail: balkema@balkema.nl; Internet site: http://www.balkema.nl
A.A. Balkema Publishers, Old Post Road, Brookfield, VT 05036-9704, USA
Fax: 802.276.3837; E-mail: info@ashgate.com

For the complete set of three volumes, ISBN 90 5809 018 3

For Volume 1, ISBN 90 5809 019 1

For Volume 2, ISBN 90 5809 020 5

For Volume 3, ISBN 90 5809 021 3

© 1998 A.A. Balkema, Rotterdam
Printed in the Netherlands

The Geotechnics of Hard Soils – Soft Rocks, Evangelista & Picarelli (eds) © 1998 Balkema, Rotterdam, ISBN 90 5809 018 3

Table of contents

Foreword

XI

1 Investigations, classification and testing for soil characterisation	
Stress-strain-strength and stiffness characteristics of rock samples from Maddhapara, Bangladesh	3
<i>M.A Ansary, A. Siddique, M.S.A. Siddiquee & M.H. Ali</i>	
Geological and geotechnical features of the 'Calcarenite di Marsala'	15
<i>M.Arces, S.Aversa, G.Lo Cicero & N.Nocilla</i>	
The Gaudio culture: Prehistoric tombs in soft rocks	27
<i>G.Arpaia, P.De Simone & S.Saiello</i>	
Homogeneous and localised deformation in sandstone specimens tested in a triaxial cell	37
<i>P.Bésuelle & J.Desrues</i>	
Internal instrumentation for strain measurements on soft rocks tested in an axisymmetric triaxial cell	45
<i>P.Bésuelle & J.Desrues</i>	
The Penetration Index for in situ characterization of hard soils and soft rocks	49
<i>J.J.Bosio</i>	
Soft rocks of the Rio de la Plata Basin, South America	55
<i>J.J.Bosio & M.A.Kanji</i>	
Triaxial testing in uncemented sandstone	63
<i>E.N.Bromhead & M.K.Patel</i>	
Weathering processes in crystalline rocks of the Sila Massif, Calabria, Southern Italy, as predisposing factor for the development of debris flows	73
<i>D.Calcaterra, M.Parise & L.Dattola</i>	
Physical and structural properties of a pyroclastic soft rock	85
<i>M.Cecconi & G.Viggiani</i>	
Laboratory study of the effect of drilling fluids on piles socketed into soft rock	93
<i>F.Cheng & C.M.Haberfield</i>	

One-dimensional compression of a natural clay: Structural changes and mechanical effects <i>F.Cotecchia & R.J.Chandler</i>	103	The investigation of weathering process in Eocene flysch <i>P.Miščević</i>	267
Geotechnical characterization of a young residual soil/gneissic rock of a slope in Pernambuco, Brazil <i>R.Q.Coutinho, J.B.Souza Neto, M.L.S.C.Barros, E.S.Lima & H.A.Carvalho</i>	115	Effect of seepage on the properties of weakly cemented sandstone <i>H.R.Nikraz</i>	273
Simple index tests for assessing the durability properties of mudrocks <i>M.A.Czerewko & J.C.Cripps</i>	127	Regional scale assessment of expansive soils as a geo-hazard <i>M.E.Popescu, M.S.Rosenbaum, D.H.Schreiner & P.C.Nathanail</i>	283
Une simulation en laboratoire de la désagrégation des roches argileuses de la Formation Corumbataí, Rio Claro, Brésil <i>J.de Oliveira Campos</i>	137	Development of FRICON, the frictionless cone penetrometer <i>A.Porbaia, T.Tsuchida, N.Yamane & T.Kishida</i>	289
Classification of some dry clayey hard soils 'Tafla deposits' in Egypt <i>M.El-Sohby, S.O.Mazen & M.Aboushook</i>	147	Liquefaction characteristics of back-filling sand for gas pipe laying works and the influence of lime mixing <i>K.Sato, T.Kinoshita & N.Yoshida</i>	295
The centrifuge technique for artificial shale specimen preparation: Applications and limitations <i>M.A.Fam & M.B.Dusseault</i>	153	Caractéristiques mécaniques des marnes de l'Oligocène du bassin de Marseille <i>J.F.Serratrice</i>	301
Caractérisation in-situ et au laboratoire du comportement non linéaire d'une argile fortement surconsolidée <i>A.Fodil, P.Y.Hicher & F.Laigle</i>	161	Engineering-geological characteristics of marl from Eocene flysch in the City of Split, Croatia <i>S.Šestanović</i>	311
Etude en laboratoire du comportement mécanique d'une molasse <i>B.Gaudin & J.F.Serratrice</i>	173	Applicability of the small diameter sampler with two chamber hydraulic pistons for hard soils <i>T.Shogaki, S.Shirakawa & F.Nakamura</i>	315
Geomechanical spectrum of argillaceous rocks <i>J.F.Heitz, A.Hauderville & N.Hoteit</i>	183	Variation of the natural geoelectric field in rock massif as the effect and measure of the stress state changes <i>N.M.Syrnikov & Y.S.Rybnov</i>	321
Caractéristiques en gonflement d'une argile indurée <i>P.J.Huergo, K.Boulmaïz & Y.Chaouch</i>	191	Shear strength of uniform weak mudstone: Rock shear tests vs triaxial compression tests <i>K.Tani</i>	327
Effect of infill on the shear behaviour of soft joints <i>B.Indraratna, A.Haque & N.Aziz</i>	199	Long-term thermo-mechanical behaviour of Boom Clay <i>J.Fr.Thimus & D.De Bruyn</i>	337
Geotechnical characteristics of cemented sand deposits in Kuwait <i>N.F.Ismael</i>	207	Variabilité de paramètres physiques et mécaniques: Importance du choix des paramètres <i>J.P.Troalen</i>	343
A contribution to geotechnical engineering in HSSR of Adriatic coast area <i>I.Jašarević & Ž.Lebo</i>	217	Collapsibility of desiccated calcareous soil – A case study <i>G.Vaciago & R.Ingrossi</i>	351
The weathering crust of the Neogene marly-clayey sediments <i>D.Jevremović, D.Sunarić & M.Regoje</i>	231	Identifying the reserve of strength and stiffness characteristics due to cemented structure of a saprolitic soil from granite <i>A.Viana da Fonseca</i>	361
Correlation of properties of soft rocks <i>M.A.Kanji & V.R.Galván</i>	239	Underground waters and geotechnical properties of Belgrade pannonian sediments <i>V.Vujanić, Lj.Rokić, M.Jotić & J.Josipović</i>	373
Influence of moisture on triaxial compression behaviour of soft sandstone <i>J.M.Kate & C.S.Gokhale</i>	245	Analysis of the oedometer stress path <i>R.Zentar, G.Moulin & P.Y.Hicher</i>	383
Shear behavior of soft rock exposed to alternate dry and wet under constant stresses <i>H.Kusumi, K.Nishida, C.Matsushita & K.Teraoka</i>	253	2 Selection of soil parameters: Modelling the soil behaviour	
Development and use of a triaxial cell for soft rocks <i>D.C.F.Lo Presti, M.Barla, G.Barla, O.Pallara, A.Plescia & A.Grigore</i>	259	The influence of natural soil structure on the mechanical behaviour of a stiff clay <i>A.Amorosi & S.Rampello</i>	395

Rate-dependent deformability and strength characteristics of rocks <i>Ö.Aydan & P.Nawrocki</i>	403	Model simulation of uncemented and cemented calcareous sediments <i>M.K.Islam, J.P.Carter & D.W.Airey</i>	561
Interpretation of pressuremeter tests carried out in stiff clays <i>R.Bahar</i>	413	An in-situ multi-stage shear test of rock reinforced with rock-bolts <i>H.Iwamoto, T.Shimoguchi, M.Nakajima, M.Maruoka & M.Aoki</i>	571
Deformation characteristics at small strain levels of dense gravel <i>K.Balakrishnaiyer, J.Koseki, G.Modoni, L.Q.Anh Dan & F.Tatsuoka</i>	423	Prediction of strength and deformation of cemented geomaterials <i>K.Kasama, H.Ochiai & N.Yasufuku</i>	579
Time dependent behavior of hard marls <i>J.Bergues, D.Nguyen minh & N.Hoteit</i>	431	Author index	587
Argiles et Craies du tunnel sous la Manche, grains sans et avec colle <i>J.Biarez, T.Fayad, S.Tailliez & A.Gomes Correia</i>	437		
Effects of slaking on the strength of clay shales: A critical state approach <i>M.E.Botts</i>	447		
Stress-strain behaviour of residual soils of Botucatu sandstone <i>L.A.Bressani, A.V.D.Bica, F.B.Martins & P.M.V.Ferreira</i>	459		
The effect of bond degradation in cemented clayey soils <i>A.Burghignoli, S.Miliziano & F.M.Soccodato</i>	465		
An experimental investigation of the mechanical behaviour of a pyroclastic soft rock <i>M.Cecconi, G.Viggiani & S.Rampello</i>	473		
Modelling of the undrained behaviour of wellbores <i>X.Chen, C.P.Tan, C.M.Haberfield & B.Wu</i>	483		
Characterising the elastic response of very stiff coarse grained soils <i>T.Cuccovillo & M.R.Coop</i>	491		
Influence of soil structure on the behaviour of two natural stiff clays in the pre-failure range <i>A.d'Onofrio, L.Olivares & F.Santucci de Magistris</i>	497		
Geomechanical behaviour of a dry loam tested with a true triaxial apparatus <i>Ph.Duchêne</i>	507		
Subsidence and wellbore stability during the excavation of oil wells <i>P.Fontana, R.Lagioia & R.Nova</i>	519		
Influence of tectonisation on geomechanical parameters of cataclastic rocks: Experience from the Cleuson-Dixence project <i>J.Habimana, V.Labiouse & F.Descoeuilles</i>	529		
Prediction of properties change of Cretaceous granitic rocks, Kitakyushu granite, by the freezing and thawing <i>I.Hirano, T.Sadahiro, K.Kikuchi, Y.Mito, M.Nishibayashi & M.Baba</i>	537		
Undrained cyclic shear behaviour and particle crushing of sand under high confining stress <i>M.Hyodo, A.F.L.Hyde, Y.Nakata & N.Aramaki</i>	545		
Mechanical properties of railway ballast from laboratory tests <i>D.Ionescu, B.Indraratna & H.D.Christie</i>	551		