Guangxin Li · Yunmin Chen · Xiaowu Tang Eds.

Geosynthetics in Civil and Environmental Engineering

Geosynthetics Asia 2008
Proceedings of the 4th Asian Regional Conference on Geosynthetics in Shanghai, China





Guangxin Li Yunmin Chen Xiaowu Tang

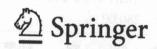
Geosynthetics in Civil and Environmental Engineering

Geosynthetics Asia 2008 Proceedings of the 4th Asian Regional Conference on Geosynthetics in Shanghai, China

With 1,173 figures

江苏工业学院图书馆 藏 书 章





图书在版编目 (CIP) 数据

第四届亚洲土工合成材料学术大会论文集 = Geosynthetics in Civil and Environmental Engineering: 英文/李广信, 陈云敏, 唐晓武主编. 一杭州. 浙江大学出版社, 2008.6 ISBN 978-7-308-05919-0

I. 第… II. ①李… ②陈… ③唐… III. 土木工程一合成材料—学术会议—文集—英文 IV. TU53

中国版本图书馆 CIP 数据核字 (2008) 第 082370 号

Not for sale outside Mainland of China 此书仅限中国大陆地区销售

第四届亚洲土工合成材料学术大会论文集 李广信 陈云敏 唐晓武 主编

责任编辑 张 琛

封面设计 Frido Steinen-Broo

出版发行 浙江大学出版社

网址: http://www.zjupress.com

Springer-Verlag GmbH

网址: http://www.springer.com

排 版 浙江大学出版社电脑排版中心

印 刷 杭州杭新印务有限公司

开 本 880mm×1230mm 1/16

印 张 56

字 数 3000 千

版印次 2008年6月第1版 2008年6月第1次印刷

书 号 ISBN 978-7-308-05919-0 (浙江大学出版社) ISBN 978-3-540-69312-3 (Spring-Verlag GmbH)

定 价 280.00元

版权所有 翻印必究 印装差错 负责调换

浙江大学出版社发行部邮购电话 (0571)88072522



Preface

The 4th Asian Regional Conference on Geosynthetics (Geosynthetics Asia 2008) was held on 17-20 June 2008, in Shanghai, China. The previous Asian Regional Conferences on Geosynthetics were held in Banaglore, India, 1997; Kuala Lumpur, Malaysia, 2000; and Seoul, Korea, 2004. Geosynthetics Asia 2008 was organized by the Chinese Chapter of International Geosynthetics Society (CCIGS) and the Chinese Technical Association on Geosynthetics (CTAG) with the support of the Shanghai Investigation Design and Research Institute (SIDRI), Zhejiang University, and Shanghai Hejie Tech & Trading Co. Ltd., under the auspices of the International Geosynthetics Society (IGS) and the Chinese Hydraulic Engineering Society (CHES).

China presently has numerous large-scale infrastructure developments in the planning stage or under construction. Some of the projects include the Development of Western Regions, the South to North Water Diversion, the 2008 Beijing Olympic Games, the 2010 Shanghai World-Expo. Geosynthetics Asia 2008 provided an excellent opportunity for the exchange of information amongst academia, professional engineers, and industrial suppliers of geosynthetics.

Under the conference theme, "Geosynthetics in Civil and Environmental Engineering", a total 238 abstracts were submitted and 157 papers were collected in addition to the Special Lecture, the Mercer Lecture, 3 Keynote Lectures, and 8 Invited Reports. The topics of the research papers were related to fundamental principles and properties of geosynthetics, testing and test standards, physical tests and centrifuge tests, reinforcement, soil improvement and ground improvement, filter and drainage characteristics, landfill engineering, geosystem usage, transportation applications, geosynthetics-pile support systems and geocell usage, hydraulic applications, ecological techniques and case histories. The papers were from 22 countries and regions (i.e., Australia, Austria, Brazil, Canada, China, France, Germany, Greece, Hong Kong China, India, Iran, Italy, Japan, Jordan, Korea, Malaysia, Singapore, Thailand, Turkey, USA, Vietnam, and West Pacific). The Technical Committee of Geosynthetics Asia 2008, under the support of the Paper Review Board organized by persons from Zhejiang University, Tsinghua University, Tianjin University, Hohai University, Tongji University, and Shanghai University. The Technical Committee followed the guidelines of the International Geosynthetics Society (IGS) to ensure that a high technical standard was maintained for all papers. The Organizing Committee of Geosynthetics Asia 2008 would like to express their sincere gratitude to the Shanghai Investigation Design and Research Institute, Zhejiang University, Chinese Production Base on Geosynthetics-Lingxian, Shandong, Tai'an Modern Plastic Co. Ltd, Key Laboratory of Port Geotechnical Engineering of the Ministry of Communications, PRC, and CCCC-Tianjin Port Engineering Institute Ltd, for their generous financial support.

It is our desire that the Proceedings of the 4th Asian Regional Conference on Geosynthetics provide an opportunity for the exchange of views among the academicians, technocrats, and professional engineers. It is our belief that all sectors will benefit through the sharing of knowledge and experience related to the design and use of geosynthetics.

Professor Guangxin LI

Chairman of Organizing Committee of Geosynthetics Asia 2008

Li Guengo

Advisory Committee

Dr. Ing. Daniele A. Cazzuffi (Italy, IGS Immediate Past President)

Prof. Fumio Tatsuoka (Japan, IGS President)

Prof. Jorge Zornberg (USA, IGS Vise-President)

Prof. Masashi Kamon (Japan, IGS Asian Activities Committee President)

Mr. Gao Anze (Chinese Hydraulic Engineering Society)

Mr. Liu Zongyao (Chinese Technical Association on Geosynthetics)

Prof. Wang Zhenghong (Beijing University of Technology)

Mr. Bao Chenggang (Yangtze River Scientific Research Institute)

Mr. John W. Cowland (Strategy/Membership Committee Chairman)

Mr. Mike Sadlier (Australasian Chapter President)

Dr. G.V. Rao (Indian Chapter President)

Mr. Gouw Tjie Liong (Indonesian Chapter President)

Dr. Hiroshi Miki (Japanese Chapter President)

Dr. Sam-Deok Cho (Korean Chapter President)

Dr. Chew Soon Hoe (South East Asian Chapter President)

Prof. Dennes T. Bergado (Thai Chapter President)

Dr. Rong-Her Chen (West Pacific Regional Chapter President)

Organizing Committee

Prof. Li Guangxin (Tsinghua University)

Mr. Shi Xiaoqiang (Shanghai Investigation, Design & Research Institute)

Mr. Chi Jingkui (Chinese Chapter of IGS)

Ms. Bai Jianying (Chinese Technical Association on Geosynthetics)

Asso. Prof. Chen Lun (Tsinghua University)

Prof. Tang Xiaowu (Zhejiang University)

Dr. Dave T.T. Chang (Chung Yuan University)

Mr. John W. Cowland (Strategy/Membership Committee Chairman)

Technical Committee

Prof. Yan Chi (Tianjin University)

Prof. Chen Yunmin (Zhejiang University)

Mr. Shi Xinming (Ministry of Railways)

Mr. Tian Junfeng (Ministry of Transportation & Communication)

Conference Secretary

Mr. Chi Jingkui (Vice President of Chinese Chapter of IGS)

Prof. Tang Xiaowu (Secretary of Chinese Chapter of IGS)



Paper Review Board

A. Arulrajah (Australia)

S.R. Lo (Australia)

J.G. Zhang (Australia)

P.C. Lodi (Brazil)

M.S. Mok (Canada)

J.F. Chen (China)

L. Chen (China)

W.D. Deng (China)

Z.L. Dong (China)

Y.Y. Fei (China)

S. J. Feng (China)

D. Gao (China)

Y.X. Jie (China)

G. Lin (China)

Y. X. Liu (China)

L.H. Li (China)

Z. Y. Liu (China)

X.M. Qu (China)

Y.M. Shu (China)

X.W. Tang (China)

H.M. Wu (China)

C. Xu (China)

S.F. XU (China)

C. Yan (China)

O.R. Yan (China)

H. P. Yang (China)

J. Zhang (China)

M.X. Zhang (China)

C. Duquennoi (France)

D.K. Atmatzidis (Greece)

H. Zanzinger (German)

J.W. Cowland (HongKong, China)

S. Kazempoor (Iran)

D. Cazzuffi (Italy)

Y.J. Du (Japan)

T. Harada (Japan)

S. Imaizumi (Japan)

T. Inui (Japan)

H. Ishimori (Japan)

T. Mukunoki (Japan)

M. Nishimura (Japan)

N. Yasufuku (Japan)

X. Zhang (Japan)

Omar Al-Hattamleh (Jordan)

T.W. Yee (Malaysia)

H.B. Ng (Thailand)

A.A. Javadi (United Kingdom)

M.C. Lu (U.S.A)

And others

Organized by



Chinese Chapter of

International Geosynthetics

Society





International Geosynthetics Society

Under the auspices of



Shanghai Investigation Design and

Research Institute



Zhejiang University



HEJIE

Shanghai Hejie Tech & Trading

Co. Ltd.



Chinese Technical Association on Geosynthetics



Chinese Hydraulic Engineering Society

Contents

Fundamental Principles and Properties of Geosynthetics

INVESTIGATING THE RELATIONSHIP BETWEEN CREEP AND WATER FLOW CAPACITY OF GEO-SYNTHETICS

C. Duquennoi, R. Gallo and A. Thomas (3)

STUDY ON VERTICAL PERMEABILITY COEFFICIENT OF NONWOVEN GEOTEXTILE

L. F. Liu, R. H. Li and J. K. Chi (8)

DISCRETE ELEMENT MODELLING OF GEOGRID PULLOUT TEST

J. Zhang, N. Yasufuku and H. Ochiai (11)

STUDY ON THE WHOLE STABILITY ANALYSIS METHOD FOR REINFORCED SOFT FOUNDATION OF EMBANKMENT WITH GEOFABRIC

H.X. Tang and H.Q. Wang (15)

STRESS RELAXATION BEHAVIORS OF NONWOVEN GEOTEXTILE COMPOSITES

H.Y. Jeon, B.W. An, H.J. Kim, Y.J. Kim, G.Y. Cui and Y.S. Jang (20)

PREDICTION OF WEATHERABILITY OF GEOSYNTHETICS UNDER EXPOSURE CONDITIONS

H.Y. Jeon, W.S. Lyoo, Z.L. Shen and K.Y. Lee (25)

ENVIRONMENTAL STRESS CRACK RESISTANCE OF GEOMEMBRANE BY NCTL TEST

H.Y. Jeon, Y.S. Jang and K.Y. Lee (30)

WEATHERING DEGRADATION OF POLYESTER AND POLYPROPYLENE GEOTEXTILES

P.C. Lodi, B.S. Bueno, O.M. Vilar and N.S. Correia (35)

EVALUATION OF GEOMEMBRANE UV DEGRADATION USING MELT FLOW INDEX AND OXIDATIVE INDUCTION TIME TESTS

P.C. Lodi, B.S. Bueno and O.M. Vilar (40)

UV EXPOSURE OF POLYMERIC GEOMEMBRANES

P.C. Lodi, B.S. Bueno and O.M. Vilar (44)

PROGRESSIVE FAILURE PROPERTIES OF SAND RETAINING WALL REINFORCED WITH DENTI-STRIP INCLUSIONS

M.X. Zhang, H. Zhou, C.C. Qiu and T.J. Chen (49)

EVALUATION ON STRESS CRACKING RESISTANCES OF VARIOUS HDPE DRAINAGE GEONETS

M.S. Mok, E. Blond, J. Mlynarek and H.Y. Jeon (54)

INFLUENCE OF SOLUTION CHARACTERISTICS ON SWELLING AND HYDRAULIC PERFORMANCE OF GEOSYNTHETIC CLAY LINERS

C. Xu, X.Y. Liao and Z.B. Li (58)

POST-CONSTRUCTION TIME HISTORY OF TENSILE FORCE IN GEOGRID ARRANGED IN A FULL-SCALE HIGH WALL

W. Kongkitkul, D. Hirakawa, T. Sugimoto, S. Kawahata, T. Yoshida, S. Ito and F. Tatsuoka (64)

EXPERIMENTAL STUDY ON CREEP PROPERTIES OF PLASTIC GEOGRID UNDER LOW TEMPERATURE

E.L. Wang, X.Y. Xu, B. Zhang, H. Zhong, Z.K. Gao and J.D. Chang (70)

THE USE OF BETA NUCLEATION TO IMPROVE THE PROPERTIES AND LOWER THE COST OF POLYPROPYLENE GEOGRIDS

P. Jacoby (74)

EFFECTS OF Y TYPE PP FIBERS AND HYDROXYETHYL METHYLCELLULOSE (HEMC) ON DRY-SHRINKAGE OF CEMENT MORTARS

L.F. Liu, R.H. Li, X.J. Yang and J.Z. Ren (78)

UNIFIED CONSTITUTIVE CURVES OF STRAIN-HARDENING MEDIUM AND STRAIN-SOFTENING MEDIUM

Q. Sun and S.Q. Qin (82)

Testing and Test Standards

CHARACTERISTICS OF SELF-HEALING OF GCL

X. Li, Y.M. Shu and X.R. Wu (87)

DEVELOPMENT AND IMPORTANCE OF TESTING AND SPECIFICATION OF GEOSYNTHETICS

J. Zhang (91)

PERMEABILITY TEST AND SHEAR TEST ON GEOSYNTHETIC CLAY LINER

Y.X. Jie, Z.B. Fu, T. Peng and G.X. Li (95)

LONG-TERM PROTECTION EFFICIENCY OF NONWOVEN POLYPROPYLENE GEOTEXTILES

D.K. Atmatzidis, D.A. Chrysikos, T.N. Blantzoukas and A.T. Kondyli (99)

STUDY ON CREEP STRENGTH TEST OF HIGH-STRENGTH GEOGRID

Q.R. Yan, W.D. Deng and C.Z. Deng (105)

DEVELOPMENT OF THERMO-GRAPH INSPECTION FOR GEOMEMBRANE SEAM EVALUATION

H. Nakayama, T. Shimaoka and S. Ueda (110)

UNDRAINED AND DRAINED TRIAXIAL TESTS OF FIBER-REINFORCED SAND

C.W. Chen and J.E. Loehr (114)

ACCELERATED TESTING OF GEOSYNTHETICS FOR DESIGN AND MATERIAL CONFIRMATION SUPPORT

Sam R. Allen (121)

CREEP TESTS OF GLASS FIBER REINFORCED PLASTICS

L.H. Li, L. Chen and Z. Wang (128)

STUDY ON HYSTERESIS PROPERTIES OF PIEZOMETER TUBES USING CIRCULATING WATERMODEL

L.H. Li, L. Chen, J. Li and Z. Wang (132)

Physical Tests and Centrifuge Tests

EVALUATION OF INTERFACE PARAMETERS FROM PULLOUT TEST IN SILTY SAND AND WEATHERED CLAY

D.T. Bergado, P.V. Long, J. Saowapakpiboon and P. Voottipruex (139)

PULLOUT BEHAVIOUR OF DIFFERENT GEOSYNTHETICS EMBEDDED IN GRANULAR SOILS

N. Moraci and G. Cardile (146)

PROTECTION EFFICIENCY OF NONWOVEN POLYPROPYLENE GEOTEXTILES AGAINST IMPACT DAMAGE

D.K. Atmatzidis and D.A. Chrysikos (151)

STUDY ON DIRECT SHEAR TEST ON INTERFACE PERFORMANCE OF GEOGRID AND CORASE-GRAINED SOIL

W.D. Deng, C.Z. Deng and Q.R. Yan (157)

CENTRIFUGAL MODELING OF A GEOGRID-REINFORCED EMBANKMENT ON SOFT SUBSOIL

J.F. Chen, S.B. Yu, J. Han, Z.M. Shi and M.R. Shen (162)

DETERMINATION OF INTERFACE SHEAR STRENGTH OF GEOSYNTHETICS USING CENTRIFUGE

W. Wu, M.S. Acharya and F. Aschauer (168)

EXPERIMENTAL INVESTIGATION OF PULL-OUT RESISTANCE OF UNIAXIAL GEOGRIDS

G. Baykal and O. Dadasbilge (174)

DEVELOPMENT AND APPLICATION OF CS-LB01 GEOSYNTHETICS PULLOUT TEST SYSTEM

H.P. Yang, M. Guo, L. Wan and Y.X. He (179)

GEOTECHNICAL CENTRIFUGE EXPERIMENT AND FORCE ANALYSIS OF REINFORCED CUSHION WITH PILE CAP NET STRUCTURE EMBANKMENT

B.P. Doanh, Q. Luo, L. Zhang and Y. Yang (185)

CENTRIFUGE SHAKING TABLE TESTS ON SATURATED REINFORCED SOIL WALLS

J. Izawa and J. Kuwano (191)

CENTRIFUGE MODELING ON FIBER REINFORCED FLY ASH SLOPE

D.K. Bhardwaj and J.N. Mandal (197)

Reinforcement

IMPORTANCE OF STRONG CONNECTION BETWEEN GEOSYNTHETIC REINFORCEMENT AND FACING FOR GRS INTEGRAL BRIDGE

F. Tatsuoka, D. Hirakawa, H. Aizawa, H. Nishikiori, R. Soma and Y. Sonoda (205)

STUDY ON SEISMIC PERFORMANCE OF GEOGRID REINFORCED SOIL RETAINING WALLS AND DEFORMATION CHARACTERISTICS OF BACKFILL SOIL

S. Nakajima, K. Hong, S. Mulmi, J. Koseki, K. Watanabe and M. Tateyama (211)

DEVELOPMENT OF REINFORCED EARTH WALL SYSTEM WITH STEEL-FRAMED FACING

S.D. Cho, K.W. Lee, J.H. Kim, C. Choi and C.W. Seo (216)

GEOGRID REINFORCED SEGMENTAL RETAINING WALL FOR NH5, DHARMAVARAM TO TUNI, ANDHRA PRADESH, INDIA

T.W. Yee and P. Dutta (221)

WETTING-INDUCED GEOSYNTHETIC REINFORCED SLOPE FAILURE

J.Y. Wu and A.H. Tang (229)

SIMULATING PLANE STRAIN TESTS OF SAND SPECIMEN REINFORCED WITH H-V ORTHOGONAL INCLUSIONS BY PFC

S.L. Zhang, M.X. Zhang and A.A. Javadi (234)

INVESTIGATION ON RESTRAINT EFFECT OF GEOGRIDS ON SHALLOW LAYER FAILURE OF EXPANSIVE SOIL SLOPE

M.Y. Wang, J.T. Cai, H. Xu and Y.H. Tang (238)

DETERMINATION OF CUT SLOPE REINFORCEMENT USING AHP TECHNIQUE

J.G. Han, J.Y. Lee and M.H. Lee (244)

GEOMETRY DESIGN METHOD CONSIDERING SURCHARGE LOAD BEHIND TIERED REINFORCED SOIL WALL

J.G. Han, K.K. Hong, J.S. Kim and M.H. Lee (249)

STUDY ON THE GEOGRID REINFORCED SOIL RETAINING WALL OF CONCRETE RIGID FACE BY FIELD TEST

G.Q. Yang, P. Lv, B.J. Zhang and Q.Y. Zhou (255)

EFFECT OF REINFORCED SAND CUSHION ON THE LIMIT FILL HEIGHT OF EMBANKMENT ON SOFT CLAY FOUNDATION

L.M. Wei, J.D. Niu and H.J. Huo (261)

APPLICATION OF THE GEOGRID REINFORCED SOIL RETAINING WALLS FOR A HIGH SLOPE SUPPORTING PROJECT

H. Zhu, Y. Ma, Y.X. Liu and J. Wang (266)

USING FLAC^{3D} NUMERICAL SIMULATION METHOD TO CHOOSE THE REINFORCED LENGTH OF THE SOIL RETAINING WALL

J.W. Su and Y.M. Shu (271)

UPPER-BOUND LIMIT ANALYSIS OF REINFORCED SLOPES FOR CLAY SOIL

X.J. Feng, Q. Yang and C.Z. Xiao (277)

AN EXPERIMENTAL STUDY ON THE EFFECT OF REINFORCING MATERIALS FOR THE STABILIZATION OF SOFT GROUND

S.D. Cho, T.G. Ham, K.S. Yang and S.K. You (281)

NUMERICAL SIMULATION OF GEOGRID REINFORCED LIGHTWEIGHT GEOMATERIALS ON SOFT GROUND AREA

T. Tanchaisawat, D.T. Bergado, Y.P. Lai, S. Piyaboon and P. Anujorn (286)

A STUDY ON THE DEFORMATION BEHAVIOR OF LABORATORY GEOSYNTHETICS REINFORCED SOIL WALLS

M.S. Won, Y.S. Kim and K.J. Lee (291)

REDUCED SCALE SHAKING TABLE TESTS ON GEOSYNTHETIC REINFORCED SOIL RETAINING WALLS

E. Guler and O. Selek (295)

A NUMERICAL MODEL FOR EPS GEOFOAM SEISMIC BUFFERS

Y.M. Wang and R.J. Bathurst (300)

ELASTO-VISCOPLASTIC SIMULATION OF BEARING CAPACITY CHARACTERISTICS OF STRIP FOOTING ON REINFORCED SAND

F.L. Peng, M.S.A. Siddiquee and F. Tatsuoka (305)

INFLUENCE OF INTERFERENCE ON FAILURE MECHANISM OF CLOSELY CONSTRUCTED CIRCULAR FOOTINGS ON REINFORCED SAND

A.Alimardani Lavasan and M. Ghazavi (311)

ANALYTICAL STUDY ON GEOTEXTILE-REINFORCED SOIL RETAINING WALLS DAMAGED DURING THE 2004 MID NIIGATA PREFECTURE JAPAN EARTHQUAKE

M. Mizuhashi, H. Sugita and T. Sasaki (318)

INTERNAL STABILITY ANALYSIS OF SEGMENTAL GEOGRID-REINFORCED SOIL RETAINING WALLS

H.B. Liu (322)

BEARING CAPACITY OF RING FOOTINGS ON REINFORCED CLAY

A.H. Boushehrian and N. Hataf (328)

THE HORIZONTAL DEFORMATION STUDY ON THE GEOGRID REINFORCED EARTH RETIANING WALL

Y. Zhao, G.Q. Yang, B.J. Zhang and P. Lv (332)

COMPARE ANALYSIS OF INFLUENCE OF SOIL PROPERTY UPON GEOSYNTHETICS REINFORCE-MENT EMBANKMENT

C. Yan, S. Li and J.P. Zhou (336)

DESIGN AND CONSTRUCTION OF A 20-METER HIGH REINFORCED SOIL RETAINING WALL

S.Q. Gui, Z. B. Zhu, Q. Li and P. Luo (342)

Soil Improvement and Ground Improvement

GEOSYNTHETIC REINFORCED POND ASH SUBGRADE FOR RURAL ROADS AND COMPANY OF THE PROPERTY OF THE P

G. Venkatappa Rao and Goutam K. Pothal (349)

A STUDY ON SHEAR STRENGTH AND DEFORMATION OF SANDY SOIL REINFORCED WITH TIRE CORD WASTES

M. Esna-ashari and M. Asadi (355)

THE USE OF GEOTEXTILE TO COUNTER HEAVE PROBLEM IN SPREAD FOOTING IN JORDANIAN EXPANSIVE SOIL

Omar H. Al-Hattamleh (360)

TREAT CUT SLOPES WITH EXPANSIVE SOILS ADOPTING GEOGRID-REINFORCED TECHNIQUE

H.P. Yang, S. Wang and Y.X. He (364)

EXPERIMENTAL STUDY ON THE STRENGTH CHARACTERISTICS OF EXPANSIVE SOIL REINFORCED WITH SYNTHETIC FIBERS

Y.H. Tang, C.G. Bao, M.Y. Wang and J.H. Ding (369)

CHANGE OF FAILURE MECHANISM OF CEMENT TREATED CLAY BY ADDING TIRE CHIPS

Y. Kikuchi, T. Sato, T. Nagatome, Y. Mitarai and Y. Morikawa (374)

APPLICATION OF CEMENT-MIXED GRAVEL REINFORCED BY GEOGRID FOR SOFT GROUND IMPROVEMENT

T. Matsumaru, K. Watanabe, J. Isono, M. Tateyama and T. Uchimura (380)

EFFECT OF POLYPROPYLENE FIBERS ON THE STRENGTH AND ELASTIC MODULUS OF SOIL-CEMENT

L. Zhang, X.X. Wang and G. Zheng (386)

EXPERIMENTAL INVESTIGATION ON STRENGTH AND MECHANICAL BEHAVIOR OF COMPACTED SOIL-FIBER MIXTURES

T. Harianto, S. Hayash, Y.J. Du and D. Suetsugu (392)

INFLUENCE OF SO₃ CONTENT ON THE STRENGTH OF CEMENT-FLY ASH STABILIZED CRUSHED-STONES

X. Chen, M.K. Zhou, P.L. Cong and X. Li (398)

Filter and Drainage Characteristics

DRAINAGE CHARACTERISTICS OF REINFORCED DRAINAGE GEOTEXTILE FOR LANDFILL COLLECTION SYSTEM

J.Y. Lee, J. H. Jeong and M.H. Lee (405)

PILOT SCALE FIELD TEST FOR NATURAL FIBER DRAIN

J.H. Kim and S.D. Cho (409)

FILTRATION PERFORMANCE OF A SILT/GEOTEXTILE SYSTEM WITHIN A TRIAXIAL PERMEA-

COMPARE ANALYSIS OF INFLIENCE OF SOL PROPERTY CON GEOST NIHEROS REINSTEM

A.A. Aziz, T.A. Mohammed and H. Omar (415)

EVALUATION OF DISCHARGE CAPACITY WITH VARIOUS VERTICAL DRAIN CORE TYPES

E.C. Shin, Zhanara Nazarova, K.Y. Cho, S.H. Kim and J.K. Kang (420)

L-SHAPED GEODRAIN IN EMBANKMENT MODEL TEST AND NUMERICAL SIMULATION

M. Saito; S. Shibuya, J. Mitsui and K. Hara (428)

IN-SOIL HYDRAULIC TRANSMISSIVITY OF GEOSYNTHETIC DRAINS IN THE LABORATORY

K. Hara, J. Mitsui, K. Mitsumune, J.G. Chae and S. Shibuya (434)

VACUUM-PVD COMBINATION WITH EMBANKMENT LOADING CONSOLIDATION IN SOFT BANGKOK CLAY: A CASE STUDY OF THE SUVARNABHUMI AIRPORT PROJECT

J. Saowapakpiboon, D.T. Bergado, J.C. Chai, N. Kovittayanon and T.P. de Zwart (440)

THE PERFORMANCE OF ALTERNATIVE GEOCOMPOSITES FOR DRAINAGE UNDER LABORATORY AND FIELD CONDITIONS

C.A. Silva, E.M. Palmeira and A.R.L. Silva (450)

STRENGTH INCREASE OF PVD-IMPROVED SOFT CLAY UNDER STAGED EMBANKMENT LOADING

L. Ma, S.L. Shen and X.W. Tang (456)

RENOVATED VACUUM CONSOLIDATION WITH ELECTROOSMOSIS

Y.W. Jin (460)

Landfill Engineering

GEOSYNTHETICS COVER SYSTEM FOR THE REMEDIATION OF A DISMISSED INDUSTRIAL SITE IN MILANO

MINISTER THE PROPERTY OF THE CHARLES AND AN ARTHUR D. Cazzuffi, P. Recalcati and G. Tresso (467)

LARGE-SCALE SHEAR TESTS ON INTERFACE SHEAR PERFORMANCE OF LANDFILL LINER SYSTEMS

HOZ FO ZU, HIGOM DITTALE GIVA HIGO EM. Kamon, S. Mariappan, T. Katsumi, T. Inui and T. Akai (473)

LEACHATE FILTER GEOTEXTILE AND APPLICATION FOR LAOGANG MUNICIPAL SOLID WASTE LANDFILL, SHANGHAI

CHTDASWOD TO ROLLANDI JADIMAN DAM CIVA HTDIAN I'V MO VOLLAN T.W. Yee and K.H. Wong (479)

CASE HISTORY: KWAI CHUNG PARK VIADUCT AT GIN DRINKER'S BAY LANDFILL, HONGKONG

G. Ng (486)

EVALUATION OF TENSILE FORCE OF LINER SYSTEM WITH THE VARIATION OF HEIGHT OF INCINERATED ASH

S.F. Xu, H. Zhang, M.Y. Hu and S. Imaizumi (492)

EVALUATION OF CLAY GEOSYNTHETIC BARRIERS IN LANDFILL COVER SYSTEMS

H. Zanzinger (496)

ABILITY OF CONCRETE ANCHORAGE FOR GEOMEMBRANE BARRIER IN LANDFILL

S. Imaizumi, T. Sekiya, K. Ozawa, K. Arakawa, H. Wakabayashi and H. Tsujimoto (502)

INTERPRETATION OF INSTALLATION DAMAGE OF GEOGRIDS BY CONSIDERING ENVIRONMENTAL CONDITIONS

H.Y. Jeon, A. Bouazza, S.D. Cho and D. Cazzuffi (508)

ANALYSIS OF ENVIRONMENTAL CONDITION EFFECTS OF WASTE LANDFILL ON GEOMEMBRANE PERFORMANCE

H.Y. Jeon, K.Y. Lee, J.H. Kim and C.R. Kim (513)

VISUALIZATION OF CRACKS IN COMPACTED CLAYEY SOIL DUE TO USING X-RAY CT

T. Mukunoki, J. Otani, S. Camp and J.P. Gourc (517)

EXPERIMENTAL STUDY ON THERMAL STRAIN CREATING IN BARRIER SHEET IN WASTE LANDFILL

T. Harada, S. Nakai, K. Yamazaki, T. Kashiwagi, T. Nakajima and S. Imaizumi (521)

EVALUATING METHODS TO MODIFY THE CHEMICAL RESISTANCE OF GEOSYNTHETIC CLAY LINERS

T. Katsumi, H. Ishimori and R. Fukagawa (526)

FLOATING COVER FOR LEACHATE LAGOON AT HANGZHOU

M.A Sadlier and X.H. Zhou (532)

GEOGRID REINFORCED SOIL STRUCTURES TO INCREASE LANDFILL CAPACITY

J.W. Cowland (536)

MODELING OF REHABILITATION OF UNREGULATED SOLID WASTE LANDFILLS

A. Edincliler and C. Altunel (540)

RELATIONSHIP BETWEEN SHORT-TERM COMPRESSION STRENGTH AND TRANSMISSIVITY PROPERTIES OF GEONETS

M.S. Mok, E. Blond, J. Mlynarek and H.Y. Jeon (546)

GAS PERMEABILITY OF HYBRID GEOSYNTHETICS FOR LANDFILL CAP COVER

M. Nishimura, T. Akai and M. Kamon (552)

ANALYSIS OF TENSION OF GEOMEMBRANES PLACED ON LANDFILL SLOPES

S.J. Feng and L.Y. Gao (558)

INFLUENCE OF WASTE AND SUBGRADE SETTLEMENT ON LANDFILL LINIER STABILITY AND INTEGRITY

C. Xu, Y.Y. Xiao, X.Y. Liao and T.T. Chen (564)

ANALYSES OF GEOMEMBRANE AROUND CIRCULAR STRUCTURES

D. Gao, B. Zhu and Y.M. Chen (569)

NUMERICAL MODELING OF SMOOTH GEOMEMBRANE—SOIL INTERACTION SHEAR BEHAVIOUR BY DISTINCT ELEMENT METHOD

S. Kazempoor, A. Noorzad, A. Mahboubi and A. Mirghasemi (575)

NONLINEAR DIFFUSION OF SOLUTE IN SOIL COLUMN—TEST METHOD AND PRELIMINARY RESULT

Z.Z. Li, X.W. Tang, Y.M. Chen and Y. Wang (579)

Geosystem Usage

UNDRAINED SHEAR STRENGTH PREDICTION AND STABILITY ANALYSIS OF GEOCOMPOSITE REINFORCED EMBANKMENT WITH CLAYEY BACKFILL

J.C. Chai, T. Hino, Y. Igaya and A. Miyazaki (585)

GEOTEXTILE TUBE APPLICATION AS THE COFFERDAM AT THE FORESHORE WITH LARGE TIDAL RANGE FOR INCHEON BRIDGE PROJECT

S.M. Cho, B.S. Jeon, S.I. Park and H.C. Yoon (591)

CASE STUDY ON EARTH REINFORCEMENT USING SOILBAGS

Y.F. Xu and J. Huang (597)

VERIFICATION OF VIBRATION REDUCTION CHARACTERISTICS WITH SOILBAG STRUCTURE

Y. Nakagawa, G.L. Chen, T. Tatsui and S. Chida (603)

APPLICATION OF STACKED SOILBAGS FOR SLOPE PROTECTION

G.L. Chen, Y. Huang, M. Sato and S. Chida (609)

MODELLING GEOTEXTILE CONTAINER IN MARINE CONSTRUCTION USING GEOTECHNICAL CENTRIFUGE

C.Y. Tan and S.H. Chew (615)

APPLICATION OF GEOTUBES USED AS ENERGY DISSIPATER BEHIND A DAM

K. Jiang and Q. Li (621)

STUDY ON THE EXPERIMENT OF STABILITY OF UNARMORED FLAT GEOTUBE DIKE UNDER WAVE ACTION

C.R. Zhu, Y.M. Shu and J.H. Jiang (625)

FLUME EXPERIMENT AND NUMERICAL ANALYSIS FOR BANK REINFORCEMENT WITH GEO-CONTAINER

S.Q. Yang, Y.M. Shu and X.C. Yang (630)

Transportation Applications

BEHAVIOR ANALYSIS OF REINFORCED SOIL RETAINING WALL UNDER CYCLIC LOADING

Y.Y. Kim, M.S. Yoon, S.J. Han and S.S. Kim (639)

HIGH GEOGRID- REINFORCED SOIL RETAINING WALLS FOR A NEW AIRPORT

Y. Fujita, T. Sugimoto, M.Tsuda, Y. Nakamura, S. Kawahata, H. Funada, T. Yoshida, M. Ito and K. Yoshida (645) APPLICATION OF PREFABRICATED VERTICAL DRAINS TO THE CHANGI LAND RECLAMATION PROJECT, SINGAPORE

A. Arulrajah, M.W. Bo, J. Chu and H. Nikraz (651)

STUDY OF BEHAVIOUR OF BALLAST USING GEOSYNTHETICS

Satyendra Mittal, Ashok Kumar Sharma, B.V. Lokesh and Ajay Dwivedi (656)

STUDY ON THE MECHANISM OF EMBANKMENT REINFORCED WITH GEOTEXTILE BY FINITE ELEMENT METHOD

J.L. Liu, J.Q. Liu and L.W. Chen (662)

PRE-FAILURE PERFORMANCE AND FAILURE MECHANISM OF TWO TIER GEOSYNTHETIC REINFORCED SOIL WALL

C. Yoo and S.B. Kim (667)

NUMERCIAL ANALYSIS OF GEOGRID AND PLASTIC DRAINAGE PLATE USED IN EXISTED RAILWAY ALTERATION PROJECT

P. Lv, W. Pang, L.J. Meng and L.Q. Gao (673)

FEM ANALYSIS ON GEOGRID REINFORCED ASPHALT CONCRETE PAVEMENT

Y.Y. Fei and Y.H. Yang (677)

DYNAMIC FINITE ELEMENT ANALYSIS OF REINFORCED AND UNREINFORCED PAVEMENTS OVER SOFT CLAY

F.Y. Liu and Y.Q. Cai (683)

DEVELOPMENT OF ASPHALT OVERLAY FABRIC FROM JUTE AND ITS PERFORMANCE EVALUATION

M. Ghosh, P.K. Banerjee and G.V. Rao (688)

Geosynthetic-Pile Support Systems Sand Geocell Usage

GERMAN RECOMMENDATIONS FOR REINFORCED EMBANKMENTS ON PILE-SIMILAR ELEMENTS

M. Raithel, A. Kirchnerl and H.G. Kempfert (697)

DESIGN METHODS FOR PILE SUPPORTED BASAL REINFORCED EMBANKMENTS OVER SOFT CLAY

A.D. Gharpure, M. Korulla, P.V. Jayakrishnan, M. Scotto and P. Naughton (703)

THEORETICAL AND NUMERICAL ANALYS'S ON GEOSYNTHETIC-REINFORCED AND PILE WALL-SUPPORTED EMBANKMENT

B.G. Chen, J.J. Zheng, S.W. Abusharar and J. Chen (709)

CALCULATION TECHNIQUES AND DIMENSIONING OF ENCASED COLUMNS-DESIGN AND STATE OF THE ART

M. Raithe and A. Kirchner (718)

FORMULA OF PILE-SOIL STRESS RATIO IN PILE (SAND PILE)-NET (GEOGRID) COMPOSITE GROUND

L.R. Xu and D.W. Lv (724)

PERFORMANCE OF ENCASED STONE COLUMNS AND DESIGN GUIDELINES FOR CONSTRUCTION ON SOFT CLAY SOILS

S. Murugesan and K. Rajagopal (729)

ANALYSIS OF GEOSYNTHETIC REINFORCED STONE COLUMNS IN SOFT CLAY

R. Zhang and S.R. Lo (735)

NUMERICAL ANALYSIS FOR MECHANISMS OF A GEOCELL-REINFORCED BASE UNDER A VERTICAL LOAD

J. Han, X.M. Yang, D. Leshchinsky, R.L. Parsons and A. Rosen (741)

BEARING CAPACITY IMPROVEMENT OF ASPHALT PAVED ROAD CONSTRUCTIONS DUE TO THE USE OF GEOCELLS—FALLING WEIGHT DEFLECTOMETER AND VERTICAL STRESS MEASURESMENTS

A. Emersleben and N. Meyer (747)

Hydraulic Applications

DESIGN OF EARTH DAMS ALLOWING TEMPORARY OVERTOPPING BASED ON HYDRAULIC FAILURE EXPERIMENTS AND FLOOD ANALYSIS

K. Matsushima, Y. Mohri, S. Yamazaki, T. Hori, M. Ariyoshi and F. Tatsuoka (757)

EXPERIMENTAL STUDY ON THE INTERACTION MECHANISM BETWEEN GEOGRID AND EXPANSIVE ROCK BY PULL-OUT TEST

J.H. Ding, J.Tong and C.G. Bao (763)

HDPE LINED WATER RESERVOIRS FOR POWER GENERATING STATIONS

H.B. Ng (769)

GEOGRID REINFORCEMENT ON HIGH EMBANKMENT/SLOPE APPLICATION IN JINPING POWER STATION PROJECT

Z.J. Dai, N.E. Wrigley, H. Zheng, M. F Chen, Z.L. Feng and S.H. Wang (775)

IMPROVEMENT OF ARCH ACTION AT CLAY CORE-WALL OF HIGH ROCKFILL DAM BY UNITED SEEPAGE CONTROL WITH GEOMEMBRANE

Y.L. Xing, Y.M. Shu, J.F. Hua, Y.H. Li and W.Y. Zhou (780)

APPLICATION OF GEOSYNTHETICS FOR OFFSHORE BREAKWATERS AND COFFERDAMS

W.M. Kan and A.M. Liu (785)

RESEARCH ON AGEING RESISTANCE OF GEOTEXTILE

G.L. Ye, Y.L. Xue and W. Zhang (792)

ANALYSIS OF ANTI-SLIDING MECHANISM OF GEOSYNTHETIC REINFORCED BEDDING COURSE

A.M. Liu, G.L. Ye and C.Z. Huang (799)

DRAINAGE STRUCTURE OF THE GEOSYNTHETICS PREVENTING THE BACK-DIKE SILTY SOIL FROM DISPERSED IMMERSION DESTRUCTION

B. Zhang, X.M. Qu and A.L. Yuan (807)

INTEGRATION AND DEMONSTRATION OF SAND DIKES ECOLOGICAL PROTECTION TECHNOLOGY

X.M. Qu, J.L. Shu and F.P. Wu (811)

Ecological Techniques and Case Histories

INTRODUCTION AND APPLICATION OF GEOSYNTHETIC IN QINGHAI-TIBET RAILWAY CONSTRUCTION

J.J. Ge, J. Wei, L.M. Bao, X. M. Shi, L.H. Xuan and X.L. Li (817)

GEOGRID WRAPPED AROUND AND VEGETATED REINFORCED WALL APPLICATIONS IN THE VILLAGE OF OLYMPIC GAMES IN UNIVERSIADE 2005 IZMIR TURKEY

H.R. Yilmaz and T. Eskisar (823)

LANDFILL BIOREACTOR FINANCIAL ANALYSIS—MONTEREY PENINSULA LANDFILL, MARINA, CALIFORNIA

S. Purdy and R. Shedden (828)

HIGH COST OF FAILURE

R.E. Belanger, C.B. Queja and C. V. Zantua (833)

CALCULATING THEORY OF SLOPE STABILITY INFLUENCED BY COMBINED UNDERGROUND AND OPEN PIT EXTRACTION

—S.G. Sun, Q.F. Ran, D.L. Wu, J.C. Zhu, W.G. Duan and S.J. Feng (839)

VERTICAL ECOLOGICAL RESTORATION TECHNIQUE FOR THE HIGH-STEEP ROCK SLOPES OF HIGHWAY IN MOUNTAINOUS AREA

H. Zhu, D.H. Ruan and S.Y. Qin (843)

INFLUENCES OF A RAINFALL ON THE STABILITY OF GRANITE RESIDUAL SOIL SLOPES

J. Gao and J. Pan (847)

FAILURE OF SEGMENTAL RETAINING WALLS DUE TO THE INSUFFICIENCY OF BACKFILL PERMEABILITY

Abdolhosein Haddad and Gholamali Shafabakhsh (852)

DESIGN AND INSTALLATION OF ROCK FALL BARRIERS FOR THE POS SLIM PROJECT, MALAYSIA

Tiru Kulkarni and Kenneth Choo (857)

BIO-ENGINEERING APPROACH WITH JUTE GEOTEXTILE FOR SLOPE STABILIZATION

P.K. Choudhury, Arindam Das, D.N. Goswami and T. Sanyal (863)

NEWLY TECHNOLOGY ON GEOTEXTILE APPLICATION IN THE IMPROVEMENT PROJECT OF THE DEEP-DRAFT CHANNEL OF YANGTZE ESTUARY

J.F. Zhu and F.L. Zhou (868)

Fundamental Principles and Properties of Geosynthetics