Proceedings of the 16th International Conference on Soil Mechanics and Geotechnical Engineering

doi:10.3233/978-1-61499-656-9-3495

Technical activity report: TC17 – Ground improvement

Compte rendu des activités de la CT 17

Jean-Marc Debats
The Vibroflotation Group – Coordinator TC 17
Isam Shahrour
Polytech'Lille – Secretary TC 17

1 INTRODUCTION

The prime mission of the ISSMGE Technical Committee No. l7 is to foster worldwide technology transfer and know-how exchange that will effectively contribute to advancing the state of engineering and construction practice and accelerate reliable use of innovative ground improvement geosystems for a variety of engineering applications. To specifically achieve this goal in the areas of ground improvement, reinforcement and grouting, where practice has always preceded research and analytical developments, effective interaction between government, industry and academia must be established. Indeed, the Committee in its present profile represents all the different ingredients of the ground improvement community. TC17 today involves 24 country members and 38 delegates who are nominated by the President of the International Society.

In order to achieve these goals, the Committee has, over the past years, focused on promoting and developing effective technology transfer amongst the different country members of the ISSMGE and worldwide beyond these country members.

The overall scope of interest of the Committee, as set forth by its terms of reference, covers a wide variety of ground improvement technologies that can be broadly classified into three categories:

- In-situ Ground Improvement
- Ground Reinforcement
- Ground stabilisation by grouting and admixture (in close co-operation with TC 9)

The terms of reference for the committee are detailed herewith:

1. Promote the co-operation between teaching and research institutes and the industry with a minimum of one international conference every three years in the fields of ground improvement:
   1.1. Pre-compression and consolidation
   1.2. Compaction / densification
   1.3. Physical and thermal treatment
   1.4. Electrochemical and electro-osmotic treatment
   1.5. Ground reinforcement
   1.6. Grouting
   1.7. Deep and shallow soil mixing
2. Further development of the International Knowledge Database on Ground Improvement Technologies (IKDGIT)
3. Continued publication of the "Ground Improvement" journal
4. Try and concentrate research and development on the change brought to the soil itself by the various ground improvement techniques and the constitutive mechanism involved.

The following table details the various ground improvement technologies covered:

Ground Improvement

1 – In-situ ground improvement
- 1.1 -Pre-loading and consolidation (with or without vertical drains)
- 1.2 -Compaction / densification
  - Dynamic compaction
    - Vibrocompaction
    - Vibrating plates
- 1.3 -Inclusions
  - Lime stabilised columns
  - Deep and shallow soil mixing
  - Stone columns / Stone pillars
  - Sand columns / Sand pillars
- 1.4 - Physical treatment
  - Ground freezing
    - Heat treatment
      - Electro-chemical / osmotic treatment

2 – Ground reinforcement
- 2.1 – In-situ reinforcement
  - Micropiles
  - Nailing
  - Anchors
- 2.2– Engineered fills
  - Controlled fills
  - Reinforced fills
  - Geosynthetics
  - Mechanically stabilised earth (incl. reinforced earth)
  - Texsol (fibre reinforcement)

3 - Ground stabilisation with grouting
- 3.1 Cement and chemical grouting
- 3.2 permeation grouting
- 3.3 fracturing grouting
- 3.4 Jet grouting
- 3.5 Compaction grouting
- 3.6 Compensation grouting

In the following, we will briefly summarise the state of progress with regard to each one of the committee activities.

2 INTERNATIONAL KNOWLEDGE DATA BASE FOR GROUND IMPROVEMENT TECHNOLOGIES (IKDGIT

During the past three decades, a wide variety of ground improvement technologies have been developed with local experience around the world. While basic engineering concepts behind each technology are widely known, the complex know-how of design and construction has not yet been fully accessible to many in the profession. It requires a reliable, efficient and interactive technology transfer process and geographical expansion of locally based experiences.

Recognising this critical need, the Technical Committee-17 of the International Society of Soil Mechanics & Geotechnical Engineering (ISSMGE-TC-17) had undertaken a coherent international effort to bridge the gaps through the development of a computer aided technology transfer process. This project, originally sponsored by the United Nations Development Program, the US Federal Highway Administration and the participating National Societies, is called IKDGIT (International Knowledge Database for Ground Improvement Technologies).

It was our intention to try and continue the development of this tool. However, due to a lack of funding, it was not possible to achieve this goal : the data base had to be left in the state it had reached. Indeed, this goal seems to be too ambitious for our committee because of the difficulty to constantly update such a database in the absence of dedicated staff and sponsors.

3 INTERNATIONAL JOURNAL ON GROUND IMPROVEMENT

The journal, published under the aegis of the International Society for Soil Mechanics and Geotechnical Engineering with Prof. I. Juran as Editor, TC-17 as the Executive Editorial Board and Thomas Telford Limited as the publisher was specifically designed to create a world-wide process of technology transfer and to provide an effective "fast-track" vehicle for the dissemination of news regarding technological developments, feasibility studies and innovative engineering applications.

Ground Improvement aims at publishing high quality, practical papers and technical notes on all aspects of ground improvement, soil reinforcement, and treatment by grouting and admixtures. The journal is intended to be of interest to engineers, speciality contractors and academics involved in the development, design, construction, monitoring and quality control aspects of ground improvement across a wide range of civil and environmental engineering applications. With simultaneous publication on the Internet, the journal is designed to provide a "fast-track" mechanism for the dissemination of news about technological developments, analytical advances, performance evaluations, pilot and model studies, instrumented case histories and innovative applications of existing technologies.

With the continuous support of the Committee members the Journal, 8 years old, has gained an international recognition providing high quality technical papers from industry and research institutions on case studies, full-scale experiments and the latest technological developments in the various country members of TC-17.

Since ground improvement concerns also rock mechanics and soil reinforcement, the TC17 together with the editorial board and Thomas Telford as the publisher proposed the extension of the Journal to the TC 9 (soil reinforcement) and the ISRM (International Society for Rock Mechanics). This proposition was accepted by both committees. The editorial board of the journal will be soon reconstituted with members from the TC 17, TC 9 and the ISRM.

We believe that this extension presents an excellent opportunity for the development of the journal and for the share of knowledge in the area of ground improvement in both soil and rock mechanics.

4 CONFERENCES AND WORKSHOPS

The committee has organised and/or co-sponsored the following conferences and workshops:

Third International Conference on Grouting and Ground Treatment, New Orleans, Louisiana, USA, February 10-12, 2003. Organised by the Geo-Institute of ASCE and The Deep Foundations Institute.

International Workshop on Ground Improvement - Prague 2003, Satellite Conference of the 13th European Conference on Soil Mechanics and Geotechnical Engineering, Prague, Czech Republic: August 28, 2003

Session "Amélioration des sols", 13ème CONGRÈS RÉGIONAL AFRICAIN de la SIMSGE, Marrakech, Maroc, 9 décembre 2003. Organisé par le Comité Marocain de Mécanique des Sols et des Roches

Seminar on Ground Treatment, Hong Kong, April 17, 2004. Organised by the TC9 and Hong Kong Geotechnical Society

ASEP-GI 2004 "International Symposium on Ground Improvement", Paris, France, 9-10 September 2004. Organised by the LCPC and ENPC

Séminaire international sur «COMPACTAGE DES SOLS», Hammamet, Tunisie, 25-26 mars 2005, Organisé par l'Association Tunisienne de Mécanique des Sols.

"Numerical modelling in ground improvement", Special Session of the 6th European Conference on Numerical Methods in Geotechnical Engineering, NUMGE 6, Graz, Austria,, 6-8 September 2006.

5 CONCLUSIONS

We would like to thank the committee members, sponsoring industries, national and international organisations, and the National Societies for their enthusiastic support and effective cooperation throughout the development of TC-17 technical activities.

The use of ground improvement techniques gets wider every day, with ever new techniques being proposed. The need for sharing such a large experience is of the essence.

The Ground Improvement Journal and the international conferences are quite obviously very efficient ways of promoting technology transfer and knowledge exchange. However, in addition to such "traditional" tools, we are also planning to use the web-Forum of the ISSMGE in order to spread more widely the news about theoretical advances and practical experiences in the area of ground improvement.