Proceedings of the Institution of Civil Engineers
Geotechnical Engineering 155
October 2002 Issue 4
Pages 261–262

Paper 22020011

Recently in *Ground Improvement*

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Published by Thomas Telford Ltd for Technical Committee 17 of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE TC-17). Four issues per annum; circa 45 pages per issue. Current subscription (2002): £139 UK, £168 EU/rest of the world. ISSMGE members are entitled to a discount on subscription rates.

Ground Improvement aims to publish high quality, practical papers and technical notes on all aspects of ground improvement, ground reinforcement and grouting. The journal is focused towards engineers, specialist contractors and academics involved in the development, design, construction, monitoring and control aspects of ground improvement. The journal has an international feel. Over the past year 18 papers have been published with authors from nine different countries. Japan and France are particularly well represented in the recently published papers.

Summaries of a selection of papers published in *Ground Improvement* over the past year are presented below. These particular papers have been chosen to provide an indication of the range of topics covered by the journal and an indication of the work currently being carried out within this field of civil engineering across the world.

State of the art in construction aspects of deep mixing technology

A. Porbaha, J.-L. Raybaut and P. Nicholson
Ground Improvement, 2001, **5**, No. 3 123–140.

The installation technique of deep mixing (DM) and its monitoring during construction affect the quality of the improved ground. Accordingly, the objective of this paper is to examine the construction-related issues including construction techniques and monitoring of DM technology.

The paper presents details of construction equipment used for DM for both sea-based and land-based projects, different construction techniques and construction details for the installation of DM columns. The need for careful monitoring during construction is highlighted and various monitoring systems are discussed in the paper.

The paper concludes with a list of points that need to be addressed to develop the DM technology further and enhance efficiency of this form of ground improvement.

Use of reinforced soil walls bearing structures

R. Arab, P. Villard and J. P. Gourc
Ground Improvement, 2001, **5**, No. 4, 163–175.

Historically reinforced soil walls have been used primarily as retaining structures, taking little vertical load. However, real economic benefits can be realised if such retaining walls are also used as bearing structures, for example in the use of bearing bridge abutments.

To justify the use of reinforced earth walls for such uses, research programmes have been undertaken in a variety of European countries involving full-scale experiments on instrumented structures subjected to localised surcharge loading. In France two full-scale instrumented structures were built and tested to failure. Finite element analyses were carried out in parallel to model the structures and to optimise structural dimensions after calibration with respect to the experimental results. The results of the model–experiment comparison are presented in the paper and analysed along with the results of the parametric study which sets out a number of recommendations concerning the design of this type of structure.

Analysis of the consolidation of laterally loaded micropiles

I. Shahrour and N. Ata
Ground Improvement, 2002, **6**, No. 1, 39–46.

Micropiles are generally used in groups or networks in many fields, such as foundation support elements, structural foundation underpinning, excavation stabilisation and reinforcement of slopes. Analysis of micropile groups has conventionally been carried out using either drained or undrained conditions, whereas in fine grained saturated soils their response to lateral loads is expected to be time-dependent due to pore pressure build-up and dissipation.

This paper includes a numerical study of the consolidation of micropiles submitted to lateral loading. It is performed using three-dimensional finite element modelling with Biot's theory for the fluid–skeleton coupling. The behaviour of the soils is

described using an elastoplastic constitutive relation with a non-associated Mohr–Coulomb flow rule.

The first part of the paper concerns an analysis of the influence of the pore pressure build-up on the response of a single pile to a lateral load—this response is compared to the micropile under drained conditions. The second part of the paper deals with the behaviour of groups of micropiles during consolidation. Analyses are carried out to investigate the influence of both micropile spacing and number on the consolidation of groups of micropiles.

Mechanical properties of air-cement-treated soils
Y. Hayashi, A. Suzuki and A. Matsuo
Ground Improvement, 2002, **6**, No. 2, 69–78.

Poor quality *in situ* soils have been successfully treated with cement to improve their engineering properties for re-use as part of general civil engineering works. The soil can be treated with a cement slurry (cement-treated) or alternatively treated with an air foam in conjunction with the cement slurry (air-cement-treated).

The effect of mix proportions on the mechanical properties of air-cement-treated soils has not been studied in detail until now. This paper presents the findings of a comparative study into the mechanical properties of cement-treated and air-cement-treated soils. Many results are presented to illustrate differences in strength and stress–strain behaviour of the treated soils under various consolidation pressures. The effects of mix proportions on the failure criteria for the tested treated soils samples are also presented.

Recent development and improvement of vacuum preloading method for improving soft soil
S. L. Zhu and Z. H. Miao
Ground Improvement, 2002, **6**, No. 2, 79–83.

This paper discusses the use of the vacuum preloading method (VPM) in China. The concept of VPM was first proposed in 1952 by the Swedish Geotechnical Institute to provide preload for foundations without the need for surcharge fill. The Tianjin Port Engineering Institute have worked to improve the efficiency of the VPM and have successfully developed vacuum preload pressures of up to 90 kPa below the sealing membrane. The technique allows for the additional use of surcharge fill if preloads in excess of 90 kPa are required.

Details of the modifications to the VPM system are presented in the paper along with two brief case histories illustrating the adoption of this technique for improving slope stability in coastal marine works and improving soft soils below runways at the Yaoquang International Airport, Shandong Province, China.