Proceedings of the Technical Meeting TC207 – Workshop on Soil-Structure Interaction and Retaining Walls

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Published by: Georeconstruction Group of Companies
190005 Russia, Saint Petersburg, Izmaylovsky prospekt 4

ISBN 978-5-9902005-7-9
Materials of the last two major ISSMGE conferences on geotechnical engineering (Osaka 2005 and Alexandria 2009) testify to increasing importance of the actively working ISSMGE TC 207 “Soil-Structure Interaction and Retaining Walls”. A further proof of that is the decision by the Organizing Committee of the upcoming 18th ICSMGE Conference in Paris to hold two sessions under the aegis of TC207. Papers accepted for these sessions are devoted to a broad range of subjects directly related to complex calculative analysis of the system “soil-foundation-superstructure”. This area is important for further development of geotechnical engineering as a science responsible for defining degrees of risk, including the risk involved in estimation of stability of protective walls and retaining structures.

Practical importance of such calculations defeated all expectations formulated at an ISSMGE International Conference, which had taken place in the beginning of the century in Istanbul. During that conference, a special session featuring four invited lectures had been organized, one of the lectures being entrusted to the first author of this Preface. The lecture was pivotd on the importance of soil-structure interaction and retaining walls, with special reference to reconstruction and development of historic cities.

It becomes apparent from the materials published in the present collection, that the tasks of this research direction have extended into the domain of real design practice. A series of publications appeared, in which authors convincingly demonstrated convergence of calculative predictions and real stress-strain state not only for subsoils, but also for overground and underground structures. This relevance was ever so more strongly reinforced in the minds of TC 207 members during their technical meetings in Madrid, St. Petersburg, Moscow, Athens, Dubrovnik and Rostock. Additionally, in 2005 and 2008 in St. Petersburg, the State Transport University hosted two conferences devoted to the subject in question, in which specialists from 47 countries took part, and that also, albeit indirectly, points towards significance of the topics dealt with by our Technical Committee.

It is possible to note some features of growing accuracy in this research area. In 2002 a paper by Professor Shweiger was released, in which an analysis of various approaches to calculations and related software testified to the following:

1. Almost all numerical predictions (of which in the paper 16 were mentioned) of ground stability around a deep excavation in Berlin contradicted real monitoring data.
2. The fact of the studied numerical predictions having run completely amok testified to the danger or impossibility of using them in real design practice.
3. Certain errors can, in principle, be caused by insufficiency of initial soil data, with some data in a number of calculations showing incorrect correlations.
4. It is necessary to collect well-documented practical examples which will allow choosing appropriate numerical prediction techniques.

We hope, that such well-documented examples will be offered to colleagues for the purposes of testing the available software and perfecting their numerical representations.
In this aspect the materials presented for the present workshop will be of special interest. We believe that in conjunction with the published volumes of the Conference Proceedings, they will advance methods of solving geotechnical problems developed by TC 207 to a new international level, allowing expert designers to make use of the practically verified methods in real projects.

In this respect, the title of the paper by Professor R. Frank, published in this collection, “Eurocode 7 on Geotechnical Design: a Code for Soil-Structure Interaction” appears to us particularly remarkable. It means that one of the leading developers of Eurocodes confirms the importance of our TC 207. Our subsequent work within the framework of TC 207 should be directed towards perfection of European and other codes, irrespective of a status or size of any world’s region or country. In this respect, the Guidelines on Soil-Structure Interaction developed by our Technical Committee are of paramount significance.

At a recent session of the ISSMGE Board, our idea of holding a TC 207 lecture devoted to Professor Gregory Tschebotarioff was supported unanimously. This well-known American geotechnical engineer was born in Russia and studied in the oldest technical school of St. Petersburg – the Transport University. Considering his ideas, he would have been closer than anyone to the TC 207’s range of working subjects. In one of his classical works entitled “Foundations, Retaining and Earth Structures” he says: “No deformation of the soil surface beneath a structure can take place without a corresponding deformation of both the foundation and the superstructure above it … The supporting soil, the foundation and superstructure form one single unit and should therefore be considered as a whole”. Unfortunately, in his day and age there was no computational facility to fully account for that consideration.

However, these days we are in possession of powerful software complexes serving practical design with the capability of translating all modern realities, including those of high-rise buildings and underground structures, into the language of mathematics.

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Soil-Structure Interaction