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TC35 Geotechnics of Particulate Media

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SUMMARY

This administrative report sets out the goals of TC35, the actions of the Committee in the period 2005-2009, and the plans for the forthcoming four years.

TERMS OF REFERENCE

1. To promote co-operation and exchange of information about the behaviour of soil grains and granular interactions, so as to clarify the fundamental micro-mechanisms of the behaviour of soils.

2. To promote improved Discrete Element Modelling (DEM) of soil aggregates, through simulations of laboratory tests, especially with regard to the observation of grain crushing and rearrangement.

3. To encourage a micro-structural understanding of significant macroscopic behaviours such as compressibility, anisotropy, yielding, creep, cyclic liquefaction, shear rupture and tensile fracture.

4. To open up a discussion on the use of micro-structural measurements to enhance soil characterisation procedures (grading, plasticity index, CPT / SPT etc) and to clarify the selection and use of continuum parameters in geotechnical engineering practice.

5. To widen the scientific basis of geomechanics by linking with groups applying micro-mechanics to the study of granular materials in other fields of application such as rock mechanics, metal powders, ceramic pressings, and food processing.

6. To co-operate with other Technical Committees where the granular perspective is thought to be valuable to their work; this may include TC1 Offshore and Near-Shore Geotechnical Engineering, TC2 Geotechnics of Physical Modelling and Centrifuge Testing, TC3 Geotechnics of Pavements, TC6 Unsaturated Soils, TC29 Laboratory Stress Strain Strength Testing of Geomaterials, and TC34 Prediction Methods in Large Strain Geomechanics.

7. To encourage local working groups on particulate mechanics, to organise regional workshops and international symposia, and to negotiate with major journals for the creation of special issues devoted to progress in this topic.

SUPPORTING NATIONAL GROUPS

UK Travelling Workshop: Geomechanics from Micro to Macro (Coordinator: Prof. M. D. Bolton).

Japan National Committee for TC35 (Coordinators: Prof. M. Hyodo and Prof. Y. Nakata).

ACTIVITIES 2005-2009

- December 2005: 3rd UK Travelling Workshop, Bristol. (Organiser: Prof. D. Muir Wood).
- July 2005: Discussion session on geomechanics from micro to macro at JGS annual conference. (Organiser: Japan National Committee for TC35).
- July 2006: Discussion session on geomechanics from micro to macro at JGS annual conference. (Organiser: Japan National Committee for TC35).
- 12–14 September 2006: IS-Yamaguchi, Geomechanics and Geotechnics of Particulate Media, Yamaguchi University. (Organisers: Prof. M. Hyodo and Prof. Y. Nakata; edited by M. Hyodo, H. Murata and Y. Nakata, Taylor & Francis, 524p).
- December 2006: 4th UK Travelling Workshop, Southampton. (Organiser: Prof. W. Powrie).
- April 2007–September 2007: Published Reports, by Japan National Committee for TC35, “Evaluation of characteristics of soil particles and application to engineering practice”.
- July 2007: Discussion session on geomechanics from micro to macro at JGS annual conference. (Organiser: Japan National Committee for TC35).
- November 2007: A short course on DEM from the basics to applications. (Organisers: Prof. T. Matsushima, Prof. K. Maeda and Prof. Y. Nakata)
- December 2007: 5th UK Travelling Workshop, UCL, London. (Organiser: Dr B. Baudet).
- July 2008: Discussion session on geomechanics from micro to macro at JGS annual conference. (Organiser: Japan National Committee for TC35).
- November 2008: A short course on DEM theory and practice. (Organisers: Prof. T. Matsushima, Prof. K. Maeda and Prof. Y. Nakata).
- December 2008: 6th UK Travelling Workshop, Nottingham. (Organiser: Prof. G McDowell).
- August 2009: Discussion session on geomechanics from micro to macro at JGS annual conference. (Organiser: Japan National Committee for TC35).

PLANS

- 12–14 October 2010: IS-Shanghai, International Symposium on Geomechanics and Geotechnics from Micro to Macro, Tongji University, Shanghai. (Organiser: Prof. M Jiang).
- Geotechnique Special Issue(s) 2010: Soil Mechanics at Grain Scale (Editorial Chair Dr B Baudet). About twenty full papers will be published in two special issues of the journal during 2010, and selected papers will be presented for discussion at IS-Shanghai 2010.
- 14–15 December 2010: 7th UK Travelling Workshop, Cambridge. (Organiser: Prof. M.D. Bolton).

REPORT ON IS-YAMAGUCHI 2006

The International Symposium on Geomechanics and Geotechnics of Particulate Media (IS-Yamaguchi 06) was held on September 12-14, 2006, within the Faculty of Engineering of Yamaguchi University, in Ube City, Japan. This symposium was sponsored by the Japanese Geotechnical Society (JGS) and the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), with the collaboration of the ISSMGE Technical Committee on Geotechnics from Micro to Macro (TC-35), Japanese domestic TC35 and Yamaguchi University. The symposium was attended by 162 engineers, researchers and educators, including 38 overseas participants from 12 countries. The symposium, which focused on the particulate nature of soil, from a microscopic point of view up to the macro-level, consisted of paper presentations and active discussions. For three days, the technical as well as special exchange programs proceeded very smoothly.

In the technical program, there were six technical sessions, three poster sessions, and three keynote addresses. Each technical session focused on a certain theme and selected papers were presented orally. The other papers were presented in a poster session, which was conducted in a style such that after a short presentation by the paper author, active discussions were conducted in front of each poster. The session topics were as follows: first day - engineering applications of microscopic evaluation of particles; second day - discrete element and continuum modelling of granular materials; and third day - micro and macroscopic characterization. Moreover, a booth exhibition was conducted in the lobby in front of the main hall by more than ten companies and enterprises to showcase their products.

For the exchange program, a welcome reception was staged on the night of September 11th, while a special session and symposium banquet were held on September 13th (refer to the photos). With particle characteristics and slope failure as keywords, the special session consisted of special lectures on case histories of slope failures in Hong Kong, the Philippines and Japan followed by a panel discussion. The special lectures were delivered by Prof. M. Bolton of Cambridge University (U.K.) who talked about slope failures in Hong Kong and centrifuge testing; Prof. H. Murata of Yamaguchi University (Japan) who explained the collapse of the Iwakuni Expressway embankment; and Dr. M. Gutierrez of Virginia Tech (U.S.A.) who presented the results of his discrete element modelling of the massive Leyte, Philippines landslide. For any of these case histories, the general consensus was that treating soil as a continuous body may be difficult, and it would be more appropriate to handle it as a set of either discontinuous or discrete bodies. Questions raised by the audience included whether predicting future disaster would be possible, and the lecturers suggested some prospects but cautioned that such undertakings may remain difficult.

During the banquet, which was attended by several local personalities including the mayor of Ube City, the President of Yamaguchi University and the Dean of the Faculty of Engineering, there were vibrant interactions between the various representatives of each country. "Noh", a traditional Japanese entertainment registered as a World Heritage, was performed on the stage. In addition, there were magic shows, choral presentation and piano performances, all contributing to a happy and significant international exchange. The banquet was closed with the typical Japanese cheer "banzai sansho" by Prof. M. Bolton of Cambridge University, TC-35 Chairman.

