

Report on the ISSMGE TC6 Committee on Unsaturated Soils Overview and Activities 2005 - 2009

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1 INTRODUCTION

The international geotechnical community has made substantial advances in understanding of the general fundamental aspects of unsaturated soil behavior, and in demonstrating the capabilities of current theoretical frameworks and prediction methodologies in unsaturated soil mechanics as applied to geotechnical and geoenvironmental engineering. The TC6 committee promotes cooperation and exchange of knowledge in the area of mechanics of unsaturated soils, including, as examples, expansive, collapsible, residual, and arid soils, and its relevance to the solution of engineering problems. TC6 cooperates with other professional organizations and other technical committees of ISSMGE in dissemination of information about unsaturated soils, with activities focused on exchange of information about testing of unsaturated soils and prediction methodologies in applications of unsaturated soil mechanics theory.

2 COMPOSITION

The TC6 committee is composed of about 41 persons representing 29 countries. The committee Chairman is Prof. E. Alonso (Spain) and Secretary is G.A. Miller (USA). Core members of TC6 include: Prof. Tacio M. O. de Campos (Brazil), Prof. P. Delage (France), Prof. D.G. Fredlund (Canada), Dr. A. Iizuka (Japan), Prof. C. Mancuso (Italy), Prof. H. Rahardjo (SEAGS), Dr. D. Toll (UK), Prof. S.J. Wheeler (UK).

3 TERMS OF REFERENCE

The following terms of reference were accepted at the TC6 meeting May 7, 2003, in London, England. These were updated in January, 2006, to reflect changes in ISSMGE committees.

1. To promote cooperation and exchange of knowledge in the area of mechanics of unsaturated soils including, as examples, expansive, collapsible, residual, arid, and compacted soils, and its relevance to the solution of engineering problems.
2. To promote the exchange of information about testing of unsaturated soils for geotechnical and geoenvironmental purposes.
3. To participate actively in the technical program of the next International Conference on Unsaturated Soils.
4. To promote benchmark exercises to establish the capabilities of current theoretical frameworks and prediction methodologies in unsaturated soil mechanics.
5. To promote TC6-sponsored sessions on unsaturated soils at ISSMGE sponsored international and regional conferences on soil mechanics and geotechnical engineering, and to support special geotechnical and geoenvironmental conferences on unsaturated soils.

6. To cooperate actively with other technical committees whose field of activity involves important questions related to unsaturated soils, for example, TC5 on Geoenvironmental Geotechnics, JTC1 on Landslides.

4 ACTIVITIES INITIATED (some to be completed soon)

Numerous activities have been initiated or supported by the TC6 Committee in cooperation with collaborating entities. Completed activities are presented in the subsequent section. Activities that have been initiated but not yet completed are listed in this section as follows.

1. 17th International Conference on Soil Mechanics and Geotechnical Engineering, Alexandria, Egypt, Sept. 2009. TC6 has organized a workshop titled "Applications of Unsaturated Soil Mechanics in Geotechnical Engineering". The workshop includes presentations by nine distinguished TC6 committee members focusing on case histories and practical applications. Advertising for the workshop will begin in June 2009.
2. International Symposium on Unsaturated Soil Mechanics and Deep Geological Nuclear Waste Disposal (UNSAT-WASTE 2009), Geotechnical and Geoenvironmental Issues, August 2009, Shanghai, China
3. 4th Asia-Pacific Conference on Unsaturated Soils, November 2009, Newcastle, Australia
4. 5th International Conference on Unsaturated Soils, UNSAT 2010, Barcelona, Spain, Sept. 2010. The conference planning is well advanced, the website is up and abstract solicitation is underway with a deadline of July 15, 2009.
5. 6th International Conference on Unsaturated Soils, UNSAT 2014, Brisbane, Australia. A call for proposals went out in 2007. Two proposals were subsequently presented at the TC6 committee meeting in Durham, UK, in July 2008 at which time the venue was determined by vote of the committee. Preliminary planning is underway.

5 ACTIVITIES COMPLETED AND REPORTED

A list of conferences and workshops on unsaturated soils developed in cooperation with the TC6 subcommittee for 2005 – 2009 follows.

1. 16th ICSMGE, Osaka, Japan, Sept. 2005, TC6 Session on Case Histories in Unsaturated Soils Mechanics. This workshop was sponsored by the TC6 committee. The workshop was well attended, and there was excellent exchange during the question/answer period. Several interesting applications and case studies of unsaturated soil mechanics were presented.
2. 4th International Conference on Unsaturated Soils, UNSAT 2006, Carefree, Arizona, USA, April 2006. Over 400 persons attended, representing 33 countries and 34 US states. Sponsored by ASCE in cooperation with ISSMGE

- Committee TC6 and the Canadian Geotechnical Society. Two volumes of proceedings representing 215 papers were produced: Geotechnical Special Publication No. 147, "Unsaturated Soils 2006", Eds. G.A. Miller, C.E. Zapata, S.L. Houston and D.G. Fredlund, ISBN: 0-7844-0802-5, published by ASCE, 2 vols., 2581 p.
3. Second International Conference on Mechanics of Unsaturated Soils, USS 2007, Weimar, Germany, March, 2007. This conference received support from TC6. The conference chair was Tom Schanz, and this is the 2nd such conference, following a 1st successful conference held in Germany. Proceedings were published in two book volumes: "Experimental Unsaturated Soil Mechanics," Ed. T. Schanz, ISBN: 978-3-540-69872-2, Springer Proceedings in Physics, Vol. 112, 2007, 505 p. "Theoretical and Numerical Unsaturated Soil Mechanics" Ed. T. Schanz, ISBN: 978-3-540-69875-3, Springer Proceedings in Physics, Vol. 113, 2007, 235 p.
 4. 3rd Asian Conference on Unsaturated Soils, Nanjing, China, April, 2007. This was another successful unsaturated soils conference, following on two prior successful Asian Unsaturated Soils Conferences. Papers published in the Proceedings of the 3rd Asian Conference on Unsaturated Soils (UNSAT-ASIA 2007) Nanjing, China, 2007, Eds. Z.Z. Yin, Y.P. Yuan and A.C.F. Chiu, ISBN: 7-03-018739-0, Beijing: Science Press, 648 p.
 5. XIV European Conference on Soil Mechanics and Geotechnical Engineering, Madrid, Sept. 2007. TC6 conducted a workshop on unsaturated soil engineering with emphasis on benchmarking activities in unsaturated soil mechanics research. The workshop was fairly well attended. In addition, TC6 Chairmen Eduardo Alonso was a keynote speaker at the conference.
 6. 1st European Conference on Unsaturated Soils, Durham, UK, July 2008. There were 136 papers submitted and about 155 registrants 127 from Europe and the remaining 38 from outside Europe. Proceedings were published as "Unsaturated Soils. Advances in Geo-Engineering", Eds. D.G. Toll, C.E. Augarde, D. Gallipoli, S.J. Wheeler, ISBN: 9780415476928, Leiden: CRC Press/Balkema, 1006 p. All present agreed that the conference was a big success and that the organizing committee did an excellent job.

In addition to conference and workshop activities, the TC6 web site continues to be maintained and well-utilized. The Unsaturated Soils web site can be accessed at <http://www.dur.ac.uk/geo-engineering/unsaturated/tc6/tc6.html>. The web site includes information on upcoming events, publications, and communications of interest to those in the field of unsaturated soil mechanics. The activities of the TC6 and minutes from recent meetings of the committee are posted on the site. The web site is used extensively for timely and meaningful interchange of ideas amongst unsaturated soils researchers. In addition, outreach to other geo-professional is facilitated through the web page.

6 SUMMARY

The importance of unsaturated soil behavior to the solution of geotechnical and geoenvironmental problems is well-recognized, and successful applications of current prediction methodologies in unsaturated soil mechanics to these problems have been demonstrated and documented. The TC6 committee exists to promote exchange of knowledge in the area of mechanics of unsaturated soil. The committee has many exciting future challenges and endeavors for 2009 - 2013.