GSP 301

PanAm Unsaturated Soils 2017

Fundamentals

Papers from Sessions of the
Second Pan-American Conference
on Unsaturated Soils

Dallas, Texas
November 12–15, 2017

Edited by

Laureano R. Hoyos, Ph.D., P.E.
John S. McCartney, Ph.D., P.E.
Sandra L. Houston, Ph.D., D.GE
William J. Likos, Ph.D.

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Preface

The Second Pan-American Conference on Unsaturated Soils (PanAm-UNSAT 2017) was held in Dallas, Texas, November 12-15, 2017, featuring the latest research advances and engineering-practice innovations in the area of Unsaturated Geotechnics, with a focus on characterization, modeling, design, construction, field performance and sustainability.

PanAm-UNSAT 2017 follows a now well-established series of regional and international conferences on Unsaturated Soils, bringing together researchers, practitioners, students and policy makers from around the world, particularly the Americas. The conference built upon the success of PanAm-UNSAT 2013 (First Pan-American Conference on Unsaturated Soils, Cartagena, Colombia), as well as that of previous conferences on unsaturated soils hosted in the United States, including UNSAT 2006 (Fourth International Conference on Unsaturated Soils, Carefree, Arizona) and EXPANSIVE'92 (Seventh International Conference on Expansive Soils, Dallas, Texas, 1992).

Proceedings of PanAm-UNSAT 2017 have been documented in four Geotechnical Special Publications (GSP) of ASCE including Volume 1: Plenary Session Papers; Volume 2: Fundamentals; Volume 3: Applications; and Volume 4: Swell-Shrink and Tropical Soils.

Current Volume 2 (Fundamentals) consists of seven sections:

Section I, Pore Fluid Retention, includes 8 papers dealing with the definition of the soil water retention curve, role of different pore fluids, and interlinkages between water retention, volume change, and effective stress. These papers also discuss the role of new manufactured materials such as 3D printed porous media and challenging natural materials like loess and soils with different fabrics.

Section II, Hydraulic Properties, includes 9 papers dealing with a focus on prediction and measurement of key hydraulic properties of unsaturated soils such as the soil water retention curve, hydraulic conductivity, and air permeability. Papers discuss challenging materials such as mine tailings, the role of additions such as Xanthan gum to soils, as well as the behavior of silt/sand mixtures. The impact of variability and atmospheric boundary conditions are also characterized.

Section III, Numerical Modeling: Flow and Deformation, includes 10 papers dealing with the importance of consideration of soil volume change in problems of unsaturated flow. Discussions in these papers include impacts of volume change on unsaturated soil hydraulic conductivity functions and other flow/deformation coupling aspects in numerical modeling of unsaturated flow.

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Section IV, Shear Strength and Constitutive Modeling, includes 10 papers dealing with the measurement of the shear strength of unsaturated soils as well as the linkage between hydraulic properties and the shear strength. Challenging materials such as bentonite and mine tailings are characterized, and the evolution in behavior of unsaturated soils subjected to grain crushing is also considered.

Section V, Numerical Modeling: Coupled Processes, includes 5 papers dealing with coupling in Thermo-, Hydro-, and/or Chemical- Mechanical processes within unsaturated soils. The papers deal with the development of constitutive models and challenges in numerical modeling associated with fully-coupled solutions to these challenging unsaturated soil problems.

Section VI, Innovations in Testing, includes 11 papers dealing with challenging problems with unsaturated soils that required development of new testing approaches and analyses. These include the use of image analysis, seepage induced consolidation, soil-structure interaction, cone penetration testing, large-scale laboratory tests on compacted soils, thermal conductivity, and residual displacements after cyclic loading.

Section VII, Dynamic Behavior, includes 8 papers dealing with the dynamic response of unsaturated soils under both small-strain and large-strain conditions. The impacts of variables such as the degree of saturation and the grain size distribution on the small-strain shear and resilient moduli were investigated. The liquefaction potential of unsaturated soil was also investigated, as was modeling of seismic compression of unsaturated soils.

Each paper was subject to rigorous technical review during a three-phase submission process and received a minimum of two positive peer reviews before final acceptance by the corresponding session chair(s).

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The conference Program Committee would also like to acknowledge the conference Session Chairs, who guided authors and reviewers through the draft and final phases of paper submission and review. In most cases, these chairs also served as on-site moderators during the conference itself.

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02/ Dynamic Behavior of Unsaturated Soils, part II
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Laureano R. Hoyos, Ph.D., P.E., M.G-I, University of Texas at Arlington

03/ Expansive Soils and Volume Change, Part I
Rifat Bulut, Ph.D., M.ASCE, Oklahoma State University

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Jairo E. Yepes, Ph.D., Universidad Santo Tomás, Bogotá, Colombia
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Idil Deniz Akin, Ph.D., A.M.ASCE, Washington State University

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14/ Field Applications of Unsaturated Soils
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