

The Department of Civil and Environmental Engineering at the University of Houston presents...

The CIVE 6111 Graduate Seminar Series

Environmental and Energy Geomechanics: Challenges and Opportunities



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Professor

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2:45PM-3:45PM

Classroom Business Building (CBB) Room 108

Abstract

The involvement of geotechnical/geomechanical engineers in problems comprising unprecedented Thermo-Hydro-Mechanical and Chemical (THMC) conditions is every time more frequent, particularly in geo-environmental and geo-energy applications. The prediction of geo-engineering system behavior under coupled THMC conditions represents huge challenges for our profession, but also extraordinary opportunities to gain a better understanding of soils and rocks behavior under such complex extremes. Both, advanced experimental and numerical investigations are necessary to advance our knowledge in this area. In this lecture, recent developments related to geomaterials behavior subjected to simultaneous THMC perturbations will be discussed, as well as, the incorporation of the main features associated with the THMC behavior of soils and rocks in constitutive and numerical models. Some of the topics to be briefly discussed in this seminar include: behavior of swelling clays and pelletized mixtures typically used in the design of engineered barriers and seals, behavior of hydrate bearing sediments, fault reactivation triggered by gas injection, behavior of frozen soils, geo-thermal structures, compressed air storage system (CAES) design, formation and propagation of desiccation cracks in soils and rocks.

Bio

Dr. Marcelo Sanchez is a Professor in the Zachry Department of Civil Engineering TAMU. He obtained his first degree in Civil Engineering from the Universidad Nacional de San Juan (Argentina). His Master and Ph.D. (2004) degrees are from the Universidad Politecnica de Catalunya (UPC, Barcelona, Spain). His expertise lies in the area of advanced geomechanics, considering problems involving thermal, hydraulic, mechanical and geo-chemical (THMG) couplings. His research interests also cover the study of the behavior of unsaturated soils and expansive clays. The main areas of applications are: 'Energy Geotechnics' (e.g. behavior of gas hydrate bearing sediments; shallow and deep geothermal systems; hydraulic fracturing, and fault reactivation); 'Geo-environmental Engineering' (e.g. design of nuclear waste repositories), 'Foundations' (e.g. foundations on unsaturated soils) and 'Transportation Geotechnics' (e.g. railroads on shrink-swell soils; slope stability, soil nailing, and MSE walls). He has published more than 100 peer review papers. He is acting as an Associated Editor for five international journals. Among other awards, in 2012 he received, along with his co-authors, the "George Stephenson Medal" from the Institution of Civil Engineers in the United Kingdom. He is the founder and current Chairman of the ISSMGE (Int. Society for Soil Mechanics and Geotechnical Eng.) Technical Committee TC308 on "Energy Geotechnics". More information about Dr. Sanchez's activities can be found at: <https://ceprofs.civil.tamu.edu/msanchez/index.html>