

IGT-Kolloquium

Friday, 28 June 2024

Engineering a Sustainable Future and Geotechnical Innovations with Nanomaterials

Prof. Felipe Ochoa-Cornejo, University of Chile

16:00 - 17:00, ETH Zurich, Hönggerberg, HIL E7

The presentation will focus on using nanotechnologies in geotechnical engineering and how it is possible to engineer the behavior of sands for both dynamic and cyclic loading regimes through strategically executed experimental work. The experimental evidence clearly shows how nanomaterials notably enhance the performance of geostructures and geosystems, improving their dynamic properties by impacting the fabric and structure of soils for a wide range of deformations. The impact of nanotechnologies on the behavior of geosystems is attributed to the significant interaction mechanisms that arise from nano, micro, and rheological interaction effects occurring between nanomaterials and sand grains, promoting bonding/bridging at particle contacts, along with the formation of thixotropic fluids formed in the non-solid phases, modifying the fabric and granular structure of geosystems. Nanomaterials have a considerable potential to significantly alter the behavior of geosystems, with even more pronounced effects observed at higher dosages and longer pre-shear aging periods, offering new insights into soil behavior tailored modifications for earthquake geotechnical engineering, an industry of millions of dollars.

Dr. Felipe Ochoa-Cornejo, Ph.D., is a geotechnical engineer and professor of U. of Chile, specializing in the behavior of sands, earthquake engineering, and landslides. With a Ph.D. from Purdue University, his expertise has produced over 40 publications in peer-reviewed journal (18) and conferences (22), actively participating in various research grants as PI and co-PI. The dedication of professor Ochoa-Cornejo to promoting and advancing geotechnical engineering focuses on creating practical learning environments through a “hands-on” methodology with practical applications, aiming at inspiring students to practice engineering for the well-being of society. Professor Ochoa is also a consultant, serving in consulting projects related to tailings dams and mining facilities. Currently, he is also the head reviewer for designs of the tunnels for Lines 8 and 9, which crosses several and densely populated urban areas of Santiago de Chile.

