

Geo-environmental Research using Centrifuges

Researchers have come to recognize that a geotechnical centrifuge can provide a powerful experimental tool for investigation of many environmental engineering problems. A wide range of geo-environmental problems are currently being studied using centrifuge physical modeling techniques, including: measurements of soil properties such as hydraulic conductivity and consolidation behavior, studies of subsurface contaminant transport, radioactive waste migration, groundwater transport studies and flow through porous media, simulations of the long-term performance of landfill covers and liners, and other studies related to geo-environmental area. Centrifuge modeling offers the possibility of studying the behavior of a model under prototype stress conditions (loading, displacement, flow, failure, etc.) under full scale stress conditions through tests performed on small scale models. This presentation will focus on the physical modeling study of light aqueous phase liquid (LNAPL) migration through sand contained by soil cement walls. This research is a collaborative effort between Rensselaer Polytechnic Institute and Kasetsart University. The objective of this study was to investigate effects of groundwater flow on the performance of soil cement walls used as containment barriers. Groundwater flow conditions were designed to simulate the seasonal change in hydrogeology found in Thailand where heavy rainfall causes groundwater to flow to water resources, such as, pumping wells, reservoirs, and rivers. Results from this study provide insight into LNAPL migration behavior for static no-flow and directional groundwater flow conditions. The effect of groundwater flow on LNAPL migration should be taken into account when designing soil cement walls for use as containment barriers.

Biographical sketch: Dr. Inthuorn Sasanakul is a Research Assistant Professor of the Civil and Environmental Engineering Department at Rensselaer Polytechnic Institute (RPI). She also serves as a technical manager of the Geotechnical Centrifuge Facility at RPI. She received a B.E. in Civil engineering, from Thammasat University and an M.E. in civil/geotechnical engineering from Asian Institute of Technology in 2000. Dr. Sasanakul received a Ph.D. in geotechnical engineering from Utah State University in 2005. Her research interests include geotechnical earthquake engineering, soil dynamic properties, advanced geotechnical laboratory testing and centrifuge modeling testing, soil-foundation-structure interaction, and instrumentation. Dr. Sasanakul was a recipient of “ASTM Hogentogler Award of 2012”. The Hogentogler award is presented to the author(s) of an ASTM paper of outstanding merit on soil and rock. It recognizes meritorious effort and it is the most prestigious award given by Committee D18. She also received prestigious awards from the U.S. Army Corp. of Engineer including the “Commander’s Award of Public Service” with accompanying medal from the Chief U.S. Army Corps of Engineers. This medal is one of the highest awards given by the U.S. Army to civilians who provide outstanding service to the U.S. Army. This award is in appreciation for the support of New Orleans Recovery through efforts of the Evaluation Task Force of the Hurricane Katrina Interagency.