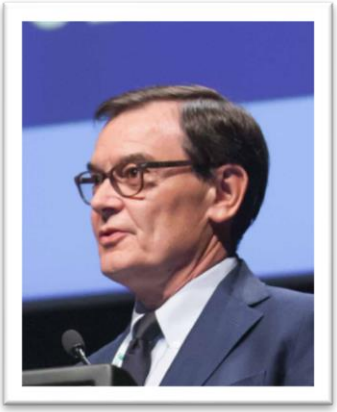
8ICEG Kerry Rowe Lecture



Prof. Mario Manassero

Politecnico di Torino, c.so Duca degli Abruzzi 24, 10129 - Torino, Italy

Kerry Rowe Lecture Title

On the intrinsic, state and fabric parameters of active clays for contaminant control

【13:30 - 14:10 , Monday 29th Oct. 2018】

Biography

Mario Manassero is the Vice-President for Europe of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) for the term 2017-2021.

He obtained his Civil Engineering degree in 1980 at Politecnico di Torino and received his Ph.D. at the same university in 1987. He has been visiting professor at University of Ancona (Italy) from 1988 to 1993, Ghent University (Belgium) in 1996 and at Colorado State University (USA) in 1995. Since 1998, he has been professor of Geotechnical Engineering at Politecnico di Torino. He has been chairman of Technical Committee (TC) no. 215 "Environmental Geotechnics" of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) for the period 2001 to 2014 and a member of the expert consulting board of the Italian Ministry of the Environment for the Environmental Impact Assessment of major national projects from 2008 to 2012. His main research activities are devoted to the characterization of soil deposits by in-situ tests, soil improvement and reinforcement methods, containment systems for landfills and polluted subsoils, vacuum extraction of subsoil pollutants and the mechanical behavior of municipal and industrial solid wastes. He has also addressed more fundamental topics like the chemo-physical interaction between pore fluids and the solid skeleton of active clays, the multiphase coupled flows and the associated subsoil pollutant transport phenomena.

He has been invited lecturer in a number of international conferences and academic celebrations. Among them it is worth to mention the State of the Art Lecture on Environmental Geotechnics, at the Millennium Conference “GEOENG2000” jointly organized by ISSMGE, ISRM e IAGEA, Melbourne, Australia (November, 2000).
He has been appointed as the second R. Kerry Rowe Lecturer by ISSMGE TC 215 and the Lecture was delivered at the 19th International Conference on Soil Mechanics and Geotechnical Engineering (ICSMGE), Seoul (Corea), 2017.

He was involved un many committees for the preparation of guidelines and regulations, at national and international level, concerning civil engineering and environmental

aspects and he was member of the Italian Geotechnical Society Committee, AGI-UNI-SC7, for the National Application Norm of the Eurocode n. 7 “Geotechnical Design” (CEN).

As far as his professional activity is concerned Mario Manassero was involved in many landmark engineering projects such as the protection of the Venice lagoon, the reclamation and rehabilitation of the Rome International Airport area, the stability assessment of the red mud tailing basin at Portoscuso (Italy), the pollutant containment diaphragm wall at Cengio (Italy) and the design of the Messina Strait bridge foundations and anchor blocs. He has also been geotechnical consultant of the Victoria State Environmental Protection Agency (Australia), contributing to the environmental planning for landfill locations as well as to the landfill design guidelines.

He has authored, co-authored and/or edited five books and more than 150 technical and scientific papers in journals and conference proceedings.

Abstract

The osmotic, hydraulic and self-healing efficiency of bentonite based barriers (e.g. geosynthetic clay liners) for containment of polluting solutes are governed both by the physico-chemical intrinsic parameters of the bentonite, i.e. the solid phase density (ρ_{sk}), the total specific surface (S), the Stern fraction (f_{Stern}) and the total fixed negative electric surface charge (σ), and by the state and fabric parameters able to quantify the soil density and microstructure, i.e. the total (e) and nano (e_n) void ratio, the average number of platelets per tactoid ($N_{l,AV}$), the effective electric fixed-charge concentration ($\bar{c}_{sk,0}$), and the Stern fraction (f_{Stern}). In turn, the fabric parameters seem to be controlled by the effective stress history, ionic valence and related exposure sequence of salt concentrations in the pore solution. A theoretical framework, able to describe the coupled chemical, hydraulic and mechanical behaviour of bentonites, has been set up. In particular, the relationships, which link the aforementioned intrinsic, state and fabric parameters of a given bentonite with its hydraulic conductivity (k), effective diffusion coefficient (D_S^*), osmotic coefficient (ω) and swelling pressure (u_{sw}) under different stress-histories and solute concentration sequences, are presented. The proposed theoretical framework has been validated through the comparison of its predictions with some of the available experimental results that have been obtained through the use of the last version of an *ad hoc* equipment able to detect, within a unique time step, all the aforementioned performance parameters, apart the hydraulic conductivity (k) that has been anyway measured by just a further time step carried out always with the same equipment and on the same bentonite sample.