8-9 March 2018

DIATI, Door 3

Meeting room 1st floor

Corso Castelfidardo, 30A

MNMs: A MODELLING TOOL FOR NANOPARTICLE TRANSPORT IN POROUS MEDIA

COURSE PROGRAM

Part 1: Theory and background -Introduction to transport phenomena in saturated porous media: advection, dispersion, equilibrium adsorption (retardation), non equilibrium linear adsorption (theory) -Mechanisms of colloid interaction (DLVO, extended DLVO): theory and examples of interaction potentials calculation (theory + interactive examples of DLVO calculation)

Part 2: 1D modeling - Introduction to modeling tools for solute and particle transport in porous media: MNMs (Micro-and Nanoparticle transport, filtration and clogging Model - Suite): Short description of interface and model structure; - Insight on colloid/porous medium interaction mechanisms: linear deposition, blocking, ripening, straining (in parallel, theory and examples using MNMs).

Part 3: Practical use of MNMs MNMs examples and tutorial for particle transport simulations in 1D domains: - predictive simulations (calculation of breakthrough curves from known parameters); - experimental data fitting (determination of model parameters from lab breakthrough curves); - Case studies of column transport tests, including forward (predictive) and inverse (fitting) modeling of experimental results.

Introduction to Radial and 3D modeling - MNMs for the simulation of particle injection in radial geometry (radial tool); - MNM3D (RT3D-based) for particle transport simulation in 3D domains.

Lecturers:

Rajandrea Sethi,
Tiziana Tosco,
Carlo Bianco
Politecnico di Torino

Overview and download to our software ca be found at
https://areeweb.polito.it/ricerca/groundwater/software/mnms-2015/

Rajandrea Sethi, Ph.D. is Full Professor of Groundwater Engineering and Head of the Department of Environment, Land and Infrastructure Engineering (DIATI), Politecnico di Torino. His studies focus on the field of groundwater engineering and in particular on flow and contaminant transport modeling, remediation technologies development, sampling techniques and environmental nanotechnologies. Since 2006, in the framework of several projects, founded by Italian government and by EU (AQUAREHAB, NANOREM and REGROUND), he has been focusing on the application and transport of micro- and nanoscale iron particles for the remediation of contaminated aquifer systems. He has been also responsible for the aquifer monitoring in the framework of the MOSE Project for the defence of the Lagoon of Venice from high tides. He is the coordinator of the Environmental Nanotechnology Laboratory.

Tiziana Tosco, Ph.D. is Assistant Professor at DIATI in the Groundwater Engineering Research Group**.** Her research activities are mainly devoted to modelling flow and transport phenomena in saturated porous media, with a particular focus on colloid transport and on the rheology of non Newtonian fluids for environmental applications. She developed freeware software for colloid transport simulation and wellhead capture zones.

Carlo Bianco, Ph.D. post-doctoral fellow at DIATI, Politecnico di Torino, in the Groundwater Engineering Research Group. His studies mainly focus on macro-scale modelling of colloid transport phenomena in saturated porous media applied to the remediation of contaminated aquifers and long term fate of nanoparticles in the environment. He developed the MNMs graphical interface.

Day one March 8th

9:00-9.30	Introduction and outline
9:30-12:30	Part 1: Introduction to transport phenomena in porous media; mechanisms of colloid interaction
12:30-14:00	Lunch break
14:00-17:00	Part 2: Introduction to 1D modeling tools (MNMs); insight on colloid/porous medium interaction mechanisms

Day two March 9th

9.30:12:30	Part 3: Practical use of MNMs for 1D: tutorial and case studies; Introduction to radial and 3D modeling

Breakthrough curve
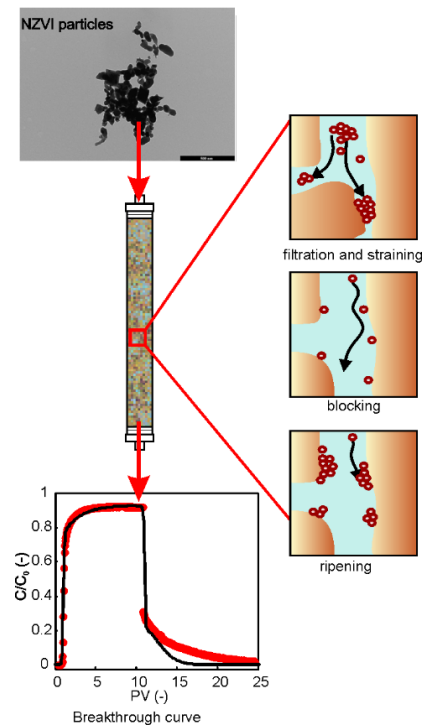
Practical information

If interested, information can be found at https://areeweb.polito.it/ricerca/groundwater/events/
We request our participants to register to this link https://goo.gl/forms/cgO6yW7HZS9KdsSG3 before the deadline on February the 26th . Participants to the Modeling Lab are requested to bring their own laptop.