DARCY LECTURE

Dec 11th, 09:30-13:10, Castigliano Room - POLITECNICO DI MILANO

organized by Ivana La Licata and Luca Alberti of the Geosciences group of DICA

Each year, a panel of scientists and engineers invites an outstanding groundwater professional to share his or her work with their peers and students through Darcy lecture series throughout the world. The 2019 Darcy Lecturer is **John Doherty**, presenting **"STARTING FROM THE PROBLEM AND WORKING BACKWARDS"**.

Many groundwater models are commissioned and built under the premise that real world systems can be accurately simulated on a computer - especially if the simulator has been "calibrated" against historical behaviour of that system. This premise ignores the fact that natural processes are complex at every level, and that the properties of systems that host them are heterogeneous at every scale. Models are, in fact, defective simulators of natural processes. Furthermore, the information content of datasets against which they are calibrated is generally low.

The laws of uncertainty tell us that a model cannot tell us what will happen in the future. It can only tell us what will NOT happen in the future. The ability of a model to accomplish even this task is compromised by a myriad of imperfections that accompany all attempts to simulate natural systems, regardless of the superficial complexity with which a model is endowed. This does not preclude the use of groundwater models in decision-support. However, it does require smarter use of models than that which prevails at the present time.

Modellers must be educated in the mathematics and practice of inversion, uncertainty analysis, data processing, management optimization, and other numerical methodologies so that they can design and implement modelling strategies that process environmental data in the service of optimal environmental management.

John Doherty, Ph.D, is the author of PEST and its supporting utility software suites. He is a self-employed consultant, who has also held positions with the National Centre for Groundwater Research and Training, Flinders University, Australia, and with University of Queensland, where he has undertaken research and supervised PhD students. He started his career as an exploration geophysicist, and then moved to environmental modelling. He has since worked in the government, private and tertiary sectors. His research interests include the continued development of software and methodologies for solution of inverse problems using environmental models, quantification of model predictive uncertainty, and appropriate use of models in the decision-making context.

https://www.groundwater.org/lecture/darcy/darcy-2019.html

PROGRAMME

09.30 – 09.45
Opening Session
(Luca Alberti - Politecnico di Milano)

09.45 – 10.15
Null space Monte Carlo particle tracking to identify PCE source areas of groundwater pollution in Milano Functional Urban Area
(Luca Alberti - Politecnico di Milano)

10.15 – 10.45
Determining contaminant flow directions using PEST and particle tracking
(Giovanni Formentin - Tethys s.r.l.)

10.45 – 11.00
Questions

11.00 – 11.30
Coffee break

11.30 – 12.15
DARCY LECTURE: STARTING FROM THE PROBLEM AND WORKING BACKWARDS
(John Doherty - Watermark Numerical Computing)

12.15 – 12.30
Questions

12.30 – 13.00
Support from PEST in the characterization of contaminated sites
(Francesca Lotti - Kataclima s.r.l.)

13.00 – 13.10
Questions

The slides will be in English. Speeches will be held in the mother tongue of the speaker.