2015 Darcy Lecture – Dr. Rainer H. Helmig

Friday, May 22, 12:00 pm,
University of British Columbia,
Earth Sciences Building (ESB), 2207 Main Mall, Room 5104-06

(http://www.maps.ubc.ca/PROD/index_detail.php?locat1=225)

The 2015 Darcy Lecturer is Rainer H. Helmig, Ph.D. who will be presenting a lecture focused on the subsurface’s influence on groundwater.

Evaluating the Competitive Use of the Subsurface: The Influence of Energy Storage and Production in Groundwater

Gain insight on how advanced numerical models may be used to analyze and predict the mutual influence of subsurface projects and their impact on groundwater reservoirs, and the increasing need to do so, during this presentation.

The subsurface is being increasingly utilized both as a resource and as an energy and waste repository. With increasing exploitation, resource conflicts are becoming increasingly common and complex, such as thermal energy storage and the effects surrounding hydraulic fracturing in both geothermal and shale gas production.

During this lecture you will learn about:

- Possible utilization conflicts in subsurface systems and how the groundwater is affected
- Fundamental properties and functions of a compositional multiphase system in a porous medium; basic multiscale and multiphysics concepts will be introduced and conservation laws formulated
- Large-scale simulation that shows the general applicability of the modeling concepts of such complicated natural systems, especially the impact on the groundwater of simultaneously using geothermal energy and storing chemical and thermal energy, and how such real large-scale systems provide a good environment for balancing the efficiency potential and possible weaknesses of the approaches discussed.

Speaker Biography: Dr. Rainer H. Helmig

Rainer H. Helmig, Ph.D., is head of the Department of Hydromechanics and Modelling of Hydrosystems in the Faculty of Civil and Environmental Engineering at the University of Stuttgart, Germany. He gained his doctoral degree from the University of Hannover in 1993 and an advanced research degree (habilitation) from the University of Stuttgart in 1997. In 1995, Helmig was awarded the renowned Dresdner Grundwasserforschungspreis for his doctoral thesis on “Theory and numerics of multiphase flow through fractured porous media.” His habilitation thesis was published by Springer in the much-cited
textbook Multiphase Flow and Transport Processes in the Subsurface: A Contribution to the Modeling of Hydrosystems. From 1997 to 2000, he held a professorship in computer applications in civil engineering at the Technical University of Braunschweig.

Helmig was cofounder and, from 2009 to 2011, president of the International Society for Porous Media (InterPore). He is spokesman of the international research training group NUPUS (Nonlinearities and Upscaling in Porous Media) with partner universities in Delft, Utrecht, Eindhoven, Wageningen, and Bergen. Helmig is a member of the executive board of directors of the Cluster of Excellence Simulation Technology at the University of Stuttgart. He is on the editorial boards of a number of journals, such as Advances in Water Resources and Computational Geosciences. Furthermore, he serves as an associate editor for Water Resources Research.

In addition, Helmig is very active as a referee and expert for multiphase flow in porous media, in particular for the German Research Foundation, but also for a large number of other organizations both in Germany and abroad. He has been the organizer and a committee member of a large number of international conferences, workshops, symposia, and sessions. Helmig has supervised and cosupervised more than 100 doctoral theses and 16 habilitation theses.

Together with coauthors, Helmig has published nearly 100 peer-reviewed articles in scientific journals as well as a further 100 articles in books, conference proceedings, and technical reports. His publications have a strong impact, in particular on the field of modeling multiphase flow through porous media. He heads a research group that is very active and internationally recognized in this field. The numerical simulators MUFTE (until 2007) and DuMuX (since then) are the products of Helmig's workgroup and collaborators.

Helmig's research covers fundamental research and applied science in the field of porous-media flow. A major focus is on developing methods for coupling hydrosystem compartments and complex flow and transport processes. This is based on simulation methods and techniques for describing single- and multiphase, multicomponent flow and transport processes in the subsurface, i.e., in porous and fractured-porous media. The fields of application for these modeling concepts cover a wide range from subsurface applications (NAPL-contaminated soils, CO2 storage, hydraulic fracturing) to technical problems (water management in PEM fuel cells).