

25 χρόνια

ΕΙΧΗΜΥΘ: 1984 - 2009

ΣΕΜΙΝΑΡΙΟ  
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## Διακεκριμένη Ομιλία

**ΟΜΙΛΗΤΗΣ:** **Majid Hassanizadeh**

Professor, Department of Earth Sciences, Utrecht University  
and Department of Soil and Groundwater Quality, Deltares-TNO, The Netherlands

**ΤΙΤΛΟΣ:** **Modelling two-phase flow and transport in industrial porous media**

**ΤΟΠΟΣ:** Αίθουσα Σεμιναρίων ΙΤΕ/ΕΙΧΗΜΥΘ

**ΗΜΕΡΟΜΗΝΙΑ:** Πέμπτη, 11 Ιουνίου 2009

**ΩΡΑ:** 12:00

### ΠΕΡΙΛΗΨΗ:

Various industrial processes involve porous media flows. Examples are processes in fuel cells, paper making, food production and safety, filtration, concrete, ceramics, moisture absorbants, to name a few. The common practice in modelling flow and transport in such porous media is to employ the concepts that have been developed in geosciences. Also, almost all models and algorithms, which are currently applied to industrial porous media, are borrowed from the geosciences. However, many industrial porous media are significantly different from soil and, correspondingly, flow and transport processes occur in different regimes. For example, constitutive relations (e.g., capillary pressure-saturation curve, relative permeability) in geosciences are obtained under (quasi) equilibrium conditions. These relations are not applicable to many industrial processes where the flow is very fast. In many industrial and natural porous media, mass transfer occurs through fluid-fluid interfaces. Current theories of two-phase, however, do not explicitly account for the presence of these interfaces.

In this presentation, we give an overview of theories of coupled flow and transport in porous media, discuss their shortcomings in relation to industrial porous media, and provide appropriate alternatives.

In particular, advanced theories of two-phase flow are introduced that include macro-scale description of fluid-fluid interfacial areas, as well as nonequilibrium capillary effects. Results of experimental and computational studies are presented that support these theories.



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#### ΣΥΝΤΟΜΟ ΒΙΟΓΡΑΦΙΚΟ ΣΗΜΕΙΩΜΑ:

Since 2004, professor of Hydrogeology at the Faculty of Geosciences of Utrecht University and Senior Advisor with Soil and Groundwater Department of TNO-Deltares. Formerly, he has been with Abadan Institute of Technology (Iran, 1979-1982), Project Manager with Yekom Consulting Engineers (Iran, 1982-1984), senior researcher with the National Institute of Public Health and Environment, RIVM (Bilthoven, The Netherlands, 1984-1995), Associate Professor (1995-2001) and later Professor (2001-2003) with the Faculty of Civil Engineering and Geosciences, Delft University of Technology. He has also held visiting faculty appointments at Notre Dame University, US, University of Bordeaux, France, and EPF Lausanne, Switzerland. Former Editor of Advances in Water Resources (1991-2001) and now Associate Editor of Vadoze Zone Journal (since 2002) and Water Resources Research (since 2004), member of International Advisory Board of Journal of Hydrologic Engineering (since 2004), and on the editorial boards of Transport in Porous Media (since 1989), Advances in Water Resources (1988-91 and since 2002), and The Open Civil Engineering Journal (since 2007). He is active as session organizer or member of various committees for the Netherlands Royal Academy of Arts and Sciences, NWO, American Geophysical Union, Soil Science Society of America, European Geophysical Union, and International Association of Hydrological Sciences. He has been leading and/or participating in a large number of projects funded by NWO, EU, TRIAS, SKB, TNO, BTS. He has supervised more than 35 graduate students; has more than 160 publications in journals, books, conference proceedings, or as technical reports; has (co-)organized 27 international conferences, workshops, and short courses; has been on the organizing/scientific committees of 25 international conferences/workshops; has given invited lectures in 44 international meetings and short courses. He was Elected Fellow of American Geophysical Union in 2002 and Fellow of American Association for Advancement of Science in 2007. He was awarded honorary degree of Doctor-Ingenieur from Stuttgart University in 2008. His research focuses on various flow and transport in porous media, through theory development, experimental studies, and modeling work. In particular, he focuses on two-phase flow, reactive transport in variably-saturated porous media, transport of micro-organisms, and biodegradation.