Geophysical Research Abstracts
Vol. 20, EGU2018-16944, 2018
EGU General Assembly 2018

Theory of Porous Media approach to simulation of contaminant transport in groundwater: verifying the numerical results with sandbox experiment

Seyed Morteza Seyedpour (1), Panagiotis Kirmizakis (2), Rory Doherty (2), and Tim Ricken (3)

(1) TU Dortmund University, Institute of Mechanics, Structural Analysis, and Dynamics, civil engineering, Germany (seyedmorteza.seyedpour@tu-dortmund.de), (2) School of Natural and Built Environment, Civil Engineering,Queen's University Belfast, (3) Institute of Statics and Dynamics of Aerospace Structures, University of Stuttgart

Groundwater is a primary resource for drinking water, agriculture and its contamination can have long-term negative influences on the environment causing severe. Aside from environmental issues, water scarcity because of droughts and intensive industrial and economic growth has increased the importance of protecting uncontaminated groundwater sources and remediation contaminated sources. Because of this, developing optimized remediation approaches for contaminated soil and groundwater is necessary to ensure the safety and sustainability of groundwater resources. Thus, the selection of a remediation technology among different remedial strategies such as chemical oxidation, air sparging and biodegradation, and also finding the optimal design for selected technology are the challenging issues with which decision-makers currently struggle. The theory of porous media (TPM), based on mixture theory, enhanced by volume fractions provides a comprehensive and excellent continuum-mechanical framework for multiphasic materials, can be utilized to simulate contaminant transport considering diffusion and advection. Using this theory, no microscopic phase discretization is required. It is a smeared, homogenized model, covering the physical real structure behavior, benefiting computational expense. Hence, this theory can help decision-makers to have better understanding about contaminant fate and also remediation process. In this study using TPM approach, we have simulated the contaminant transport in ground water and using sandbox experiment, we verified our results. Potassium permanganate was used for the changing plume distribution simulation over time and because of the intense color we were able to have also visual observations.