Critical review of the Seminar: Numerical issues and challenges in Reactive transport

Jesús Carrera presented a study on the influence of basic concepts in order to understand reactive transport. Goal of the scientific research was to provide further evidence on the effect of solute transport and chemical reactions, especially since conclusions of previous research have been problematic and disputable. His study provides an approach leading towards a impermeable structure of the topic, underlining that various challenges in his field still need more research.

The presentation started with an interesting example about oddly bright gypsum crystals from a cave in Mexico, which seemed far-fetched, regarding the topic. As Mr. Carrera started comparing gypsum crystals , which apparently need water to grow and shine, to humans, the reference to the central theme became more clear. Further Mr. Carrera explained the disastrous situation of the environment, poluted by mankind, only leaving deep groudwater as clean and healthy water source due to chemical and physical occurencies over long time periods. The understanding of the process, how solids react as a porous media when water runs through and how the cleaning process of the water works, was the main goal of the seminar.

A presented theoretical model divided the research into two subcategories, the transport and the reaction. In order to demonstrate that the aspect of transport consists of the advection, dispersion, and mixing, few examples gave opportunity to easily understand the topic, using ordinary scenes, such as a kite flying because of the air current. The second subcategory, the chemical reaction, was explained as very divers and complex. The necessity of co-researchers, being experts in chemistry, in order to solve such convoluted problem, was manifested.

Next, after the definition of the sub-categories, Mr. Carrera described the intense correlation of both, stating that the saturation index calculations are indispensable. However, he fails to indicate the amount of dissolved calcite through the processes, as the limit of the dissolution rate. The simulation of the reactive transportation was the basis for comprehending the effect of reacting solutes.

After explaining the common view, that mixing is counterfeit by means of dispersion, Mr. Carrera fortifies his claim that the procedure of mixing appeals fast reactions, by using further vivid examples. He further talked about the dispersion from integrated breakthrough curves and measure spreading, pointing out the challenge that the mixing and spreading in two seperated processes, is one of the most complicated and important challenges of his field and beyond. The allaying grows with the size of test scale, which was not effectively dealt with, posed a problem.

In total, the coherence of Mr. Carreras findings and approaches are not conclusive, making it hard to follow his study, as his sometimes quiet voice. The lack of depth in his studies, optimizing the measurements, emphasizing the research amount with greater samples, getting more defined conclusions with less scope for incredibility and implausibility, is necessary to improve the understanding of the exact coherence between mixing and spreading. In contempt of slightly inadequate methodology, Mr. Carrera provided a competent overview and study of reactive transport of groundwater in porous media.