*Remobilization**of Colloids in Porous Media Under Unsaturated Condition* *in column-scale experiments*

(Oral)

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Studies of colloid transport during transient flow in variably saturated porous media are important to determine the roles of dominant processes on particle remobilization. The main objective of this study is to develop a model to describe transport, adsorption, and release of colloids during cycles of drainage and imbibition under various saturation conditions. For this purpose, two different modelling methods were investigated. In the first set of equations, the extensions of the model of Cheng and Saires1, which was proposed by Qiulan et. al.2 is examined. This model includes the empirical coefficients that quantify the kinetics of colloid mobilization during transient conditions. This formulation assumes that attachment and detachment at the air-water interface (AWI) occurs as a function of the available air–water interfacial area (*a*). In the second approach, we assumed that colloid exchange term from the AWI is a kinetic sorption process in which the amount of fluid saturations determines the magnitude of air-water interfacial area. To obtain the optimized values of parameters we employed a genetic algorithm optimization scheme in both approaches. We found rather similar results between the two approaches, while slightly more accurate results were obtained using the second model. The results of simulations revealed a promising description of column scale experiments, using Escherichia coli D21g particles, performed by wang et al3. Numerical simulations demonstrated that the amount of colloids release is a function of the number of drainage and imbibition cycles. Furthermore, the amounts of release during the imbibition cycle was much higher than that of drainage which would be related to the important role of AWI on particle remobilization. This finding is consistent with the outcomes of experiments.

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