

Modeling Solute Transport through Porous Media with Scale Dependent Dispersion

Authors : Teodrose Atnafu Abegaze, P. K. Sharma

Abstract : In this study, an attempt has been made to study the behavior of breakthrough curves in both layered and mixed heterogeneous soil by conducting experiments in long soil columns. Sodium chloride has been used as a conservative tracer in the experiment. Advective dispersive transport equations, including equilibrium sorption and first-order degradation coefficients, are used for solute transport through mobile-immobile porous media. In order to do the governing equation for solute transport, there are explicit and implicit schemes for our condition; we use an implicit scheme to numerically model the solute concentration. Results of experimental breakthrough curves indicate that the behavior of observed breakthrough curves is approximately similar in both cases of layered and mixed soil, while earlier arrival of solute concentration is obtained in the case of mixed soil. It means that the types of heterogeneity of the soil media affect the behavior of solute concentration. Finally, it is also shown that the asymptotic dispersion model simulates the experimental data better than the constant and linear distance-dependent dispersion models.

Keywords : numerical method, distance dependant dispersion, reactive transport, experiment

Conference Title : ICHGSW 2024 : International Conference on Hydrogeology, Groundwater and Surface Water

Conference Location : Istanbul, Türkiye

Conference Dates : August 15-16, 2024