

Modeling of water transport in soil column

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Abstract. In this paper, we used the advection dispersion equation (ADE) to describe water transport through a saturated sand column. A numerical solution for ADE is obtained using the finite volume method (FVM) based on the tri-diagonal matrix algorithm (TDMA). The dispersion coefficient is estimated using the simulated annealing algorithm (SA). Numerical solutions are verified using the measured values obtained by S. Semra (2003) at various flow rates. The results show that the advection dispersion equation gives a better description to the breakthrough curves (BTCs) with lower values of root mean square error (RMSE) and higher values of determination coefficient (R^2). Also, the dispersion coefficient increases with the flow rate and it is dependent with the pore velocity by the equation: $D_L = aU^b$.

Keywords: Advection Dispersion Equation, Simulated Annealing, Breakthrough Curves.