

Analytical solutions for pollution transfer with arbitrary time-dependent surface fluxes

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ABSTRACT

1991 Taoyuan factory of Radio Corporation of America (RCA) at Taiwan due to organic chemical waste discharged into the factory caused serious groundwater pollution; many scholars have begun to study groundwater pollution simulation analysis of RCA Taoyuan factory. Although many studies have explored groundwater flow pollution simulation analysis but focused on the saturated aquifer and numerical simulations. And few scholars discussed analytical solutions of the groundwater flow pollution at unsaturated aquifer, so this paper will study the analytical solutions for pollution transfer with arbitrary time-dependent surface fluxes at unsaturated aquifer. This research is a prolongation of Chen et. al.'s (2001a, 2001b) papers and Ogata et. al.'s (1961) paper. Chen et. al.'s papers have obtained a convenient solution for arbitrary surface fluxes before ponding. Ogata et. al.'s paper has obtained an analytical solution of 1D Advection-Dispersion Equation, and by means of combination of Chen et. al.'s and Ogata et. al.'s solution, this paper has been extended to derive analytical solutions for pollution transfer with arbitrary time-dependent surface fluxes in unsaturated soil. For example of loam soil, it can simulate variation of concentration of pollution at unsaturated aquifer in the soil profile before ponding. The analytical solutions of this paper reflected real situation simulated, and can be applied to verify those complicated solution from other analytical models.