

## Monte Carlo simulation of anomalous diffusion in geologic porous media

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We performed Monte Carlo simulation to reproduce anomalous diffusion, which has been observed in long-tail profiles of column experiments and of field experiments in subsurface hydrology. The present model is developed based on Hatano & Hatano (1998). The new feature of the model is that it considers the distribution of the adsorption potential of pollutants more precisely. In this model, the period which a particle is adsorbed is determined by the following power law:

$$P(t) \sim t^{-(B)},$$

where  $t$  is the period where a particle is adsorbed at a certain site,  $P(t)$  is the probability distribution of  $t$ , and  $B$  is a constant. Note that  $P(t)$  has an infinite variance where  $B$  is less or equal to 3. Otherwise,  $P(t)$  has a finite variance, which gives the ordinary advection-dispersion equation (i.e. unable to have long-tail profiles). We determine numerically the period of adsorption  $t$  according to  $P(t)$  and perform Monte Carlo simulation. We successfully reproduce the long-tail profiles when  $P(t)$  has an infinite variance AND infinite mean. The simulation results successfully fit several data sets of column experiments.