

## ***Interactive comment on “Quantification of pore-size spectrums by solute breakthrough curves” by S. Erşahin***

### **Anonymous Referee #1**

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#### General Comments

This paper provides a novel, yet simple method for estimating the fraction of mobile water and pore water velocity from breakthrough curve experiments with a conservative tracer in packed columns of differing particle size. The theory is clearly described and tested using experimental data from replicated soil columns. Results showed good agreement between measured and predicted pore water velocity, which was closely related to particle size of the column. There was a considerable amount of variability in estimates of mobile water content across replicates for a given particle size, and no relationship between mobile water content and particle size was observed.

#### Specific Comments

It is not surprising that pore water velocity appeared to be closely related to particle size of the columns. Authors could reinforce this finding by conducting a statistical analysis of results using analysis of variance to determine whether or not the differences across particle size were significant or not. A similar analysis could be conducted with the mobile water contents.

The shapes of the breakthrough curves in Figs. 1-4 are not always very symmetrical, and do not approach  $C/C_0$  values of unity in a consistent manner. What accounts for these differences? How did authors ensure that there was no transport of solute along the face of the column wall during their experiments? Estimates of pore radius draining vary considerably, even among replicates. Could authors explain this variability by some type of preferential flow, such as lateral flow within the column along inclined micro layers?

#### Technical Corrections

Figures 1-4 could be more easily interpreted if they were drawn using consistent axis labels within and across each particle size. Each one should have the same basic layout and scale to facilitate quicker visual comparison of results. The caption should say “top, middle and lower graphs are replicates.”

There are a number of typographical errors in the paper.

p. 8379: can be “calculated” p. 8381: displacing effluent Cl “was” applied to the column number “of” pores (n) values for  $Q_i$  “were” calculated p. 8384, l 6 tremendous “amount” of flux l 18 controlled “by: completely p. 8385, l 8 compensate “for” the drawback “from” p. 8386, l 11 following “thought” experiment l 17 dispersion “is present” p. 8387, l 8 “fourth” power

Table 1: Please add values for beta and  $K_s$  to table

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 8373, 2011.

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Interactive Discussion

Discussion Paper

