

Interactive comment on “Electrical capacitance volume tomography of soil water infiltration in a vessel experiments” by M. Mukhlisin et al.

Anonymous Referee #1

Received and published: 8 March 2012

General comments: The topic of imaging of soil column water flow and solute transport is of great interest to the hydrology, soil science, and geophysics communities. The ECVT technique appears to work well and the results for the soil water infiltration experiment look promising. The paper is concise and relatively easy to understand. The use of the English language needs to be improved. I would like to see some more information on the effect of electrical conductivity (EC) on the measurements. Did you take special precautions to wash the river sand? Did you use di-water in the columns or tap water? How high can the soil water EC go before energy losses start to affect the capacitance measurements? Or, is EC not a problem?

Specific comments: Title: change to “..infiltration in vessel experiments” (remove “a”)

P1368L18 the first two sentences of the introduction need to be rewritten. The second
C262

sentence, for example, states that we need to understand the infiltration process to understand the infiltration process. This is circular.

P1369L4 the disc infiltrometer seems out of place here. This is not an imaging tool.

P1369L24 Maybe also provide the permittivities of air and solids here.

P1369L25 Is 1000 MHz the EM frequency at which you measure the capacitances? If not, what is the frequency?

Eq. 1 Notation-wise this equation uses both the operator form and Cartesian coordinates. Can you pick one?

Eq. 2 Q_j instead of $Q_{i,j}$

P1370L17 Eqs. (2) and (3), not (1) and (3)

P1371L5 Perhaps explain what is meant by “active differentiator”

P1371L15 Please explain what is meant by “soft field”

P1373L15 What is meant by “four planes”?

P1374L17 “soil density” is “dry bulk density”?

P1374L20 “capacitances were measured iteratively”. Do you really mean “iteratively”?

P1374L23 Would it be feasible to use saturated soil as eh (wetted from the bottom up to prevent air entrapment)? That way, later on, any normalized value < 1 would indicate air entrapment in the soil column.

Fig. 1 Does each hexagonal panel constitute an electrode? Fig. 4 this figure requires more explanation. What is the z-axis of the sensor and why is it dimensionless? Are the deadzones physically on the left and right of the columns or at the bottom and top?

Technical comments: P1368L15 “distribution” doesn’t seem to be the correct word.

P1375L5 “column” instead of “medium”?

