

Interactive comment on “A new criterion for determining the representative elementary volume of translucent porous media and inner contaminant” by Ming Wu et al.

Anonymous Referee #3

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Review on “A new criterion for determining the representative elementary volume of translucent porous media and inner contaminant”

Wu et al. proposed a new criterion to determine the representative elementary volume (REV) of translucent porous media and inner contaminant, compared the new criterion with previous methods in two sandbox experiments, used the new criterion to calculate REV_s of PCE plume (such as saturation, PCE-water interfacial area), and analyzed the influence of saturation on the REV_s of saturation and PCE-water interfacial area. Although I do see some improvements of the new criterion in the Figure 4, the current paper is not suitable for the publication in HESS journal and needs major revision.

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Detailed comments are as follows.

Major comments: (1) The title of the paper emphasizes on the new criterion, but only Figure 4 shows the comparison between the new criterion and other methods. Why do you design the new criterion as the current form? Why the new criterion has such improvements compared with other methods? These need to be introduced and discussed.

(2) Half part of the paper focuses on the “REVs of material properties” and “REVs of S_o and AOW for PCE plume”, but there is no introduction on those topics in the “introduction” section. This makes it confusing on the contribution of this paper as compared with previous research.

(3) The experimental design is not introduced clearly. For example, why do you use two sandboxes with different materials? Why do the two sandboxes have different size? How to observe different variables with different cuboid window scale? Moreover, I think the method and result are mixed in the current paper. For example, L241-251 and L364-373 are methods instead of the results, so the author should move them to the section 2 to clarify the whole procedure you performed.

(4) The figure organization makes the paper not easy to follow. Figures are introduced from Fig. 1c to Fig. 1a, then to Figs. 2a-b, then back to Fig. 1b. I suggest the author to reorganize the figures just as the orders they appear in the paper.

(5) Figure 4. I see the difference of REV determined by “the relative gradient error” and “the new criterion method”, which one we should trust? How to approve that the REV calculated by new criterion method is more reliable? Moreover, you can highlight the REV region in Figure 4 so that readers can directly see that.

(6) Figure 6. There is not any interpret or discussion on the Figure 6. If the figure is important, please provide detail description. If not, I suggest moving it to the supplementary.

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(7) L383-384. In the downright corner of the Figure 7a, the red line increases first, then decrease. So I do not agree with that “while REV of PCE plume presents apparent decreasing ... for Experiment-II”.

Minor comments: (1) L54, “As measured scale size ranging between L_{min} and L_{max} ,” Please give the L_{min} and L_{max} directly in the figure.

(2) Is there any reference for the conceptual representation of “REV curve” in L50?

(3) L142. “Fig. 1c” should be “Fig. 1d”.

(4) L148. What does “n” mean in the Equation 5? And, the porosity does not occur in the Equation, how do you derive the porosity from it?

(5) L218-220. What is the difference between the and ? Are they the same?

(6) The author should proofread the paper carefully, as the current paper has numerous typos. For example, L243: “Figure 2c” cannot be found in the paper. L358, “All mean REV sizes of these variables for Experiment-II are larger than REV of Experiments-II”. L386-387, the sentence does not have verb.

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