

## ***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 #2**

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This paper proposes a new criterion for identifying representative elementary volume (REV) of translucent silica sands. Two sandbox experiments were conducted to test the applicability of the proposed criterion. The authors stated that the proposed criterion is effective and reliable. However, there are some important issues in the current manuscript that should be resolved or addressed.

Major comments:

1. The authors have published a series of paper on this topic. The research gap and the reason why a new criterion for REV is need should be clearly stated in the Introduction section.

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2. Is the proposed criterion purely empirical or with some physical basis? If it is a criterion with physical basis, then the physical basis or the derivation process should also be added.

3. The blue curve of II-1 in the last figure of Fig. 4 is totally different from other curves. For other curves, the blue line becomes zero when the read line is zero. But for this figure, the blue line has a very big peak when the red line becomes zero. So the results of this figure are totally different from other figures. Such results seem does not support the authors' conclusion that "...is more convenient and reliable than other methods for REV estimation" in Lines 315-316.

4. The authors stated that "All observation cells show similar variation curves of ... that low value intervals are quite apparent, indicating that ... is vary effective to make the REV plateau obvious...", but it is not the case for the last figure in Figure 4b. As very different curves are obtained for Experiments I and II, it should be doubted that whether the new criterion is effective or not. Although the REV plateau may be identified based on the other figures in this study, but it is possibly that the REV plateau cannot easily be identified in other similar studies or in real porous materials.

5. The fit to cumulative frequency in Figure 5b is not very good. Both underestimation and overestimation exist.

6. Can the proposed criterion be applied to real world porous materials? Is the proposed criterion only applicable to the translucent silica sand used in this manuscript? The authors stated that fluid migration and transformation in porous media can be accurately simulated using the light transmission technique and the proposed criterion. Should the proposed criterion be used with the light transmission technique simultaneously? If yes, then the applicability of the proposed criterion is restricted to a very narrow range.

Minor comments: 1. Line 51: The authors used  $n$  to represent porosity, but then they used to represent porosity in Line 145. The authors again used  $n$  to represent porosity

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in Line 148 Equation (5). 2. Line 127: What are the variation ranges of  $i$  and  $j$  in Equation (1)? They should be added to the equation. 3. Line 134: Add references to Equation (2) 4. Line 142: Add references to Equations (3) and (4) 5. Line 149: The quantity  $L_s$  seems not defined 6. Line 169: Is the "Hsies" should be "Hsieh"? 7. Lines 175-176: Reputation: "the derivative... will tend to zero" 8. Lines 176-177: References should be added to this sentence. 9. Line 182: Cannot find  $i$  in Figure 1b 10. Line 194: Here is  $\rho$ , in Equation (11) is  $\rho$ , which one is correct? 11. Lines 217-218: The authors should carefully check whether  $i$  should be in subscript or superscript. 12. Lines 218-220: Double check whether  $\rho$  should be used. 13. Line 238: Cannot find  $t=1.44$  min in Figure 3b. 14. Lines 239-240: There should be error in this sentence or grammatical error 15. Line 243: There is no Fig. 2c 16. Line 253: Should be "Figs. 4a and b" 17. Line 269: There is no Fig. 4f, only Fig. 4a and 4b in this figure. 18. Line 338: Use a different symbol in Equation (16), because  $\rho$  has already been used in Equation (15). 19. Line 358 and 359: Both are Experiment II? 20. Line 618: The subscripts and superscripts in the axis titles of Figure 4 can not be clearly seen 21. The equations listed in Table 2 are already included in the main text as Equations (10), (11), (14), and (15). Table 2 should be deleted. Also delete the citations and descriptions on Table 2. 22. I would suggest the authors modifying the numbers of figures and make sure the figure numbers appear in order in the text. For example, the authors first cited Fig. 1c in Line 52 and then Fig. 1a in Line 96 and Fig. 1b in Line 140. Generally, we should first cite Fig. 1a, then Fig. 1b, and then Fig. 1c in order. 23. Table 3: Delete the equations and just list the parameter values.

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