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Drinking Water Engineering and Science Discussions

Interactive comment on "Experimental investigation of turbulent particle radial transport processes in DWDS using optical tomography" *by* R. Floris and P. van Thienen

Anonymous Referee #1

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Overall

The paper reports on interesting research being undertaken to understand particle transport mechanisms in water distribution systems (WDS) that may impact on discolouration processes and presents the initial findings from the application of a novel optical technique. It builds on previous work all published this year and aims to demonstrate theoretical to laboratory results. On the whole it is well written and generally informative, although the novel scientific work presented is limited, reporting merely on trials of 6 particle size classes from only 1 source and repeating for 16 different flow velocities. As a result only Figs 4 to 6 cover new information whilst Fig 2 and 3

are reproduced from Van Thienen et al 2011 (Water Research). The limitations of this work are evidenced in Fig 6 in that only a small area of the proposed theoretical model is covered and perhaps of greater importance the predicted patterns are generally not observed, although the occurrence of a boundary between mechanisms is detected but only for the larger sized particles, >450 μm. Unfortunately there is little discussion to explain this deviation from their model predictions or suggestion where the model could be modified. As a result the conclusions add little that was not included in the previous work. Also of relevance is that all work is focussed on particle sizes of around 500 μm where inertial effects may be observed. However it is documented that discolouration particles are typically 10 μm (e.g. Van Thienen et al 2011) so turbophoresis is unlikely to be significant in WDS. Of note is that the authors do partially acknowledge this (page 73, ln 25) together with perhaps the most valid conclusion that these preliminary findings do suggest some value of further research. With more extensive results and discussion the potential for a valid journal paper would be enhanced.

Specific Points

Pg62 ln13 - personal view that abstracts should relate to paper findings - as such should be no references (appreciate subjective)

Pg62 ln 18 'us' - please make impersonal

Pg63 ln26 introduce turbulent diffusion and turbophoresis - not explain terms until pg 65 - possibly rearrange to explain terms when first introduced.

Pg64 ln 1 introduce deposition velocity and particle relaxation time, not explain until p66 - possibly rearrange to explain terms when first introduced.

Pg64 ln21 Any examples to explain the sentence "Interest... scientific."?

Pg65 ln10 delete 'in'

Eqn 1 - 'J' is not defined until P66

DWESD

4, C15–C17, 2011

Pg67 ln10 "In the...increases" - this sentence does not read coherently.

Pg67 ln16 Fig 2, reproduced from Van Thienen (referenced) but also used to show results in Fig 6, not necessary?

Pg67 ln23 Fig 3 - this is reproduced yet not referenced from Van Thienen 2011 - acceptable?

Pg71 ln 18 "4"?

Pg71 ln21 replace "is" with "are".

Pg 71 How do you distinguish between tomograph patterns - e.g. when does annulus become ring pattern? More explanation required.

Pg73 ln5 'good' for the largest particles only otherwise results do not support this. How valid is turbophoresis for particles in WDS? Assuming 10 μm, what velocity is required for turbophoresis?

Interactive comment on Drink. Water Eng. Sci. Discuss., 4, 61, 2011.