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Drinking Water
Engineering and Science
Discussions

Interactive comment on "Can terminal settling velocity and drag of natural particles in water ever be predicted accurately?" *by* Onno J. I. Kramer et al.

Anonymous Referee #2

Received and published: 15 November 2020

This paper pulls together old data and models and combines them with new data and new analyses related to predicting the terminal settling velocity of particles in a water treatment setting. I think the paper is valuable, accurate, and should be published.

I thought the paper could have been a little more streamlined and straight-forward as there was an element of trying to publish all of their materials on this topic in one place (which I think would be a good thing). However, I was not able to identify any significant strategies for removing materials or reorganizing content. I will provide a list of minor suggested revisions below.

Line 41: Date of "Camp" reference should be 1946 (not 1852).

Line 68: Sphericity is defined later in the paper, but it could be defined here for clarity.

Line 73: Tense changes unnecessarily from "were investigated" to "will investigate"

Line 75: would be good to include a few specific examples of the models being discussed unless you are referring to all of them.

Line 114: This sounds like the solutions must be numerically approximated, which sounds negative because the solutions would be time-consuming. Please verify/clarify.

Line 196: It would be good to point out the ratio of the particle size (d) to the column diameter (D), which I think is 10mm/57mm (but there are 2 columns listed in the methods).

Figure 5: I'm less than clear on exactly what the error bars represent. Are the plotted values the average/accepted values with the error bars representing calculated changes in each parameter based on the uncertainty of the model's input parameters listed in Table 4. It is not clear why the error bars vary so much in magnitude given that all of the equations use the same variables.

Line 238: "according" should be changed to "accordingly" or "according to"... unclear as is.

Line 241: does "settle horizontally" refer to the direction of settling or the orientation of the particle?

Figures 910: It is not clear why half of each graph shows density ratios less than 1. It seems these particles would float (instead of settle) and no particles appear to fit into this range. In Fig 10, the "zig zag" region only occurs where there are no particles, and the boundaries of the "chaotic" region are unclear. Is it everywhere that is white or only below a density ratio of 1. Needs revision.

Lines 406-407: Please verify that a drag coefficient increase from 1.2 to 1.7 (42

Line 452: This might be a good place to recommend a model or two that do predict

more accurately with more complexity?

Lines 453-459: I am not certain the authors make a strong enough case for the need of greater accuracy in predicting terminal settling velocities in water treatment applications. A little extra explanation or a concrete example here would be helpful. What would result if my terminal velocity calculations were off by 20 percent? Is a 20-30

Line 463: a more specific approach or method is requested here for the use of “more morphological properties” to include which properties and/or which models. It would be even better to be quantitative here. How much more accurate would the model be with these properties included.

The last section of the conclusion is a little vague. While the authors seem to know which model(s) are best for spherical particles and non-spherical particles, I do not think this paper is ready to publish until that information is shared with the reader in the conclusion. It would be even better to share the expected level of accuracy of the predictions for each... at least for this softening process in the narrow range of conditions in terms of Ga numbers (or similar).

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